DOCUMENT RESUME

ED 165 160 CS 204 614

AUTHOR Collins, Sarah H.; Tuttle, Frederick B., Jr.
TITLE Technical and Scientific Writing.
INSTITUTION National Education Association, Washington, D.C.
PUB DATE 79
NOTE 116p.; Part of the NEA Curriculum Series; A number of pages have small type
AVAILABLE FROM National Education Association, The Academic Building, Saw Mill Road, West Haven, Connecticut 06516 (Stock No. 1718-8-00, $4.75)

EDRS PRICE MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS *Assignments; *Business English; *Course Content; Course Objectives; Higher Education; *Instruction; Learning Activities; Secondary Education; Teacher Education; *Teaching Methods; *Technical Writing; *Writing Skills

ABSTRACT

The intent of this book is to acquaint teachers with the realistic situations and composing processes that they can use when teaching business, report, and scientific writing. An introductory chapter provides a working definition of technical writing that reflects such essential writing components as recording the experience and having an awareness of the audience, purpose, and format of the communication. Three chapters then discuss the general categories of technical writing (business, report, and scientific), providing explanations of the categories, working definitions illustrated by specific examples, lists of skills necessary to perform the writing tasks, and sample instructional activities for a variety of grade levels (high school and early college). The concluding chapter shows how to implement the discussed ideas in secondary classrooms, focusing on evaluation methods and interdisciplinary approaches. Appendixes provide suggested resources for implementation (an annotated bibliography, suggestions about potential audiences and situations for assignments, and general tips to writers about paragraph organization and editing) and examples of business, report, and scientific writing formats (resumes, job descriptions, laboratory reports, police reports, and abstracts). (RL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

Technical and Scientific Writing

by Sarah H. Collins

Frederick B. Tuttle, Jr.

The Curriculum Series

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

ED165160

nea
National Education Association
Washington, D.C.

C 5209 6/4

Copyright © 1979
National Education Association of the United States

Stock No. 1718-8-00

Note:

The opinions expressed in this publication should not be construed as representing the policy or position of the National Education Association. Materials published as part of the NEA *Curriculum Series* are intended to be discussion documents for teachers who are concerned with specialized interests of the profession.

Library of Congress Cataloging in Publication Data

Collins, Sarah H.
Technical and scientific writing.

(The Curriculum series)
Bibliography: p.
1. Technical writing—Study and teaching (Secondary)
I. Tuttle, Frederick B., joint author. II. Title.
III. Series.
T11.C563 808'.066'6 78-12739
ISBN 0-8106-1718-8

ACKNOWLEDGMENTS

The authors wish to thank the following persons who were helpful to them during the development of this manuscript:

Patricia E. Tuttle for her suggestions on style and content—as well as patience and support—during this and other writing efforts;

Rowland L. Collins for his patience, wit, wisdom, and help with the housework which made this effort possible;

Walter F. Brautigan, Assistant Professor, Science Education, Department of Curriculum and Instruction, State University of New York, College at Brockport, for his help with Scientific Writing;

Peter C. Detoy, Trooper, Troop E, New York State Police, Clarkson, for writing the Police Report;

Betsy Balzano, Associate Professor, William Elwell, Associate Professor, and Ralph Jordan, Professor, Department of Curriculum and Instruction, State University of New York, College at Brockport, for their help with the gadget activity and interdisciplinary skills.

Authors

Sarah H. Collins is Professor of Language and Literature and Writing Program Administrator at Rochester Institute of Technology, Rochester, New York.

Frederick B. Tuttle, Jr., is Associate Professor of Education in the Curriculum and Instruction Department, State University of New York, College at Brockport. Among his publications are *Composition: A Media Approach* in NEA's Aspects of Learning series, and *Gifted and Talented Students* in What Research Says to the Teacher series.

Consultants

The following educators have reviewed the manuscript and provided helpful comments and suggestions: Jamie K. Mehl, Englisn teacher, Shawnee Mission West High School, Overland Park, Kansas; and Isabelle M. Kamm, Chair, English Department, Wall Township High School, Wall, New Jersey.

CONTENTS

Chapter 1	Introduction	9
Chapter 2	Business Writing	20
Chapter 3	Report Writing	36
Chapter 4	Scientific Writing	61
Chapter 5	Implementation	75
Notes		90
Appendix 1: Business Writing		91
Resumés		93
Job Description		97
Letter of Inquiry		100
Letter of Application		101
Letter of Complaint		102
Appendix 2: Report Writing		103
Note Cards		105
Bibliographical Card		106
Memo		107
Police Report		108
Abstract		112
Letter of Transmittal		113
Sample Report Format		114
Appendix 3: Scientific Writing		115
Sample Laboratory Report Form		117
Appendix 4: Implementation		119
Selected Resources		121
Real Audiences and Situations		125
Tips to Writers		127

CHAPTER 1

INTRODUCTION

In this text we use the term "technical" in a general sense to encompass both technical and scientific writing. We have, however, included both terms in the title to highlight the inclusion of both in the text. Often teachers tend to view scientific writing as different from technical writing, while we envision it as a subcategory, albeit special, of the general field of technical writing. Therefore, many of the concepts and activities discussed throughout the text apply to the teaching of scientific writing in addition to the chapter devoted specifically to that area. Conversely, many of the ideas in the chapter on scientific writing are also helpful to teachers outside that particular discipline.

WHAT IS TECHNICAL WRITING?

Although several writers have attempted to define technical writing, the term remains confused. Most solved the problem by explaining differences between technical writing and other kinds of writing or by listing pertinent characteristics of technical writing. Robert Hays cites one major difference between the technical writer and other writers as the attitude of the writer toward the subject. While attitudes of other writers toward their subjects may vary from awe to irony, the technical writer treats his/her subject with "utter seriousness." (6) This attitude, in turn, demands exacting clarity in the writing not always required of other writers. The description of a procedure may be interesting and enjoyable to read, but if the writer leaves the exact steps open to interpretation, the procedure may be performed incorrectly (for example, a plane may fail to function properly upon reaching the landing strip). As W. Earl Britton notes, the primary characteristic of technical writing "lies in the effort of the author to convey one meaning and only one meaning in what he says." (6)

This statement, however, still does not define "technical writing." Herman M. Weisman, after considering the history and traits of technical writing, has derived a brief definition. He states, "Technical writing is the factual recording of that experience or knowledge for the purpose of disseminating it." (19) While this definition is admittedly superficial, it does give us a

point of reference for our discussion and teaching. It takes into account the most important elements of technical writing as well as the characteristics which differentiate it from other kinds of writing. First, it indicates that technical writing is the factual recording of an experience. We have some experience, such as a procedure, description, analysis, or idea, which we want to record as accurately as possible. "Recording" indicates that we are reacting to the experience with as little imaginative embellishment as possible. Weisman's addition of "factual" emphasizes the need to report the experience accurately and honestly with little personal interpretation or elaboration.

Second, this definition raises the question of purpose and audience. The technical writer has to constantly consider the audience. The language of the report, the style of writing, and the medium of the report are affected by the purpose and audience. If, for example, the purpose of the communication is to inform a superior who is knowledgeable in the field about a new procedure, the writer may use a specialized vocabulary and references. If the writer is communicating the procedure to others outside the field, however, the specialized vocabulary may interfere with the meaning, and more general words would have to be substituted. Indeed, the writer may find it more appropriate to communicate the procedure to the latter audience with graphs and charts which the superior would find superficial.

Since technical writing in high school and the early years of college encompasses more than scientific procedures, we will use Weisman's definition as a base and continually reconsider the major components it raises: accurate *recording* of the experience, *audience* and *purpose* of the communication, and *format* of the communication. Within each section we will consider each component in light of the instructional procedure both through discussion and through sample learning experiences.

RECORDING THE EXPERIENCE

Too often teachers bypass this step in an effort to get to the writing, incorrectly assuming that students can automatically perform this task without practice or training. In many ways this preliminary step requires the most instructional input for students. First, students have to learn to determine which experiences are pertinent and which are irrevelant to a particular task. While some are tempted to list everything as important, others believe they have nothing worthy of recording. As teachers we have to serve both types of students. We have to help those who

see everything as equal to discriminate among a myriad of experiences, and we have to help those who lack confidence in their experiences and perceptions to see the importance and applicability of their lives and ideas. Once students are able to determine appropriate experiences for a specific task, they should learn how to communicate their perceptions to others to accomplish their purpose. During this stage of recording the experience, we begin to focus on the use of language and the specific audience, purpose, and format.

AUDIENCE

The technical writer is always writing for someone else. In teaching technical writing we should strive to help students acquire a concern for the audience as a recipient of their communications. This is often difficult in school, however, as we tend to require students to write primarily for hypothetical audiences in imaginary situations. Perhaps the best way to initiate concern is to search for real audiences and actual situations. If we can accomplish this goal, students will not be merely practicing isolated skills, rather they will be employing technical writing skills to accomplish realistic ends. In most instances the teacher should probably *not* be the audience of the communication, as this is seldom the case in "real" situations. Business letters, for example, should be written as part of more extensive experiences in search of necessary information. Reports should have audiences who are potential users of the information. In short, as teachers we should strive to put the act of writing in proper perspective as part of greater experiences than the practicing of a skill, and as often as feasible we should provide real audiences for students.

PURPOSE

According to Weisman's definition, the purpose of technical writing is to disseminate the record of an experience. Indeed, the purpose is to inform a specific audience in a manner which is most usable by that audience. However, in some instances the purpose is also to effect some action by that audience. This purpose will also affect the language and style. Although two words may carry the same definition to an audience, one may irritate while the other may please. If the purpose is to convince the audience to adopt an idea or procedure, irritation may not be the most productive route. Consequently, the purpose of the communication has to be examined closely before the audience re-

ceives it in order to determine if the communication will help achieve or frustrate the purpose.

FORMAT

Both the purpose and the audience of the communication should dictate the format used. While the writer has specific information to convey, the formats available are numerous, including lists of ideas, memos/memoranda, research reports, and forms. The format would also include decisions about the use of graphs, illustrations, and charts. For some audiences a short listing of steps may be sufficient, while for others detailed descriptions including graphs and charts may be necessary, as readers may lack the knowledge in the field to understand a brief list of suggestions. If the purpose is to influence the audience, the format decision may be based more on what would be most appreciated rather than on level of knowledge. While one prospective employer may prefer a long description of qualifications, another may want only a short list of experiences pertinent to the particular position. The writer must consider the audience and purpose in determining the format of the communication.

GRAPHIC AIDS

One feature of technical writing that differs from other forms of writing is the regular inclusion of graphic aids. The point of all technical writing is to convey information as efficiently and accurately as possible. In many cases a graphic representation of information supplements the discussion in the text and saves or clarifies words. Although most technical writing textbooks have sections on drawing charts and graphs, students may also examine graphic material from many other sources. They must be careful, however, to give full credit to these sources as they would for quoted textual material.

To illustrate the use of graphic supplements, show students a typical stockholder's report from a major company. Usually these reports contain several excellent graphics, ranging from still pictures to a variety of graphs and charts. As students discuss the graphics, they should also discuss the purpose of the writer and the effect of the illustrations on the particular audience.

OVERVIEW

Throughout our discussion of teaching technical writing, we will emphasize two factors: realistic situations and the composing process.

REALISTIC SITUATIONS

When students write only to fulfill a specific assignment given by the teacher, often their primary motivation for completion of the task is fear of failure. While in some instances such motivation may be the only re[illegible]urse, we believe that if the writing task is viewed as part of a larger, more realistic situation, the purpose for writing will be more realistic and the motivation more honest. For example, when teaching the business letter, some teachers design a unit in which all students learn a single format, compose letters to hypothetical businesses, and submit them to the teacher for evaluation. A more profitable experience might be to have students write business letters as part of a larger project in which they are seeking information from an absent party. The desire for the information has to be real and the need to write the letter actual. We have found that when the audience is someone other than the teacher and the situation realistic, students tend to take the task more seriously.

As we discuss teaching various types of technical writing, we will provide examples of realistic situations and instructional techniques which have proved successful in the past. The teacher should note, however, that these are only examples that may be modified according to her/his own objectives, students, and resources. Our general goal is to help the teacher acquire an attitude toward teaching technical writing, not to provide a recipe for instruction.

COMPOSING PROCESS

In general, composing may be viewed as a three-step process. Several educators have labeled these steps "prewriting," "writing," and "rewriting." (5, 2) Donald Murray has called these steps "prevision," "vision," and "revision" to incorporate the concept of writing as an act of discovery. (11) In an effort to delineate the instructional procedure using the composing process, Tuttle has described the steps as "stimulus," "reaction to stimulus," "rough draft," "sharing/revision," "final draft," and "submission." (15, 17, 18) For the examples in this text we have

adapted Tuttle's instructional implementation of the composing process as follows: *stimulus, reaction to stimulus, rough copy, sharing, final copy,* and *submission.* This approach has proven its effectiveness both through controlled experimentation such as that conducted by Tuttle in 1977 (18) and 1978 (16) and by Dunn in 1978 (7), as well as by curricular implementation such as that developed by Blake and Tuttle in 1977–78 (3, 4). (See also Appendix 4.)

Stimulus. A stimulus is any experience to which students may react in writing. This experience may a response to an advertisement, a need for a job, a scientific experiment, or a need to send a memo/memorandum. In addition to providing the impetus for writing, the stimulus also indicates the probable audience. It is important, therefore, that students understand the nature of the stimulus and the implications it holds for the writing.

Reaction to Stimulus. Because of the importance of understanding the stimulus, we suggest that the teacher spend a considerable amount of instructional time discussing with students the stimulus and its implications. For too long we have assumed that learners should be able to write coherently and effectively without any prewriting instruction or discussion. Students do not automatically know how to approach a topic; they need guidance. This stage serves three major purposes for writers. First, it gives them an opportunity to verbalize their thoughts. Instead of asking that students immediately transfer vague ideas to paper, we suggest that teachers encourage them to discuss their ideas, go through the intermediate stage of verbalization. Second, this stage gives writers time and opportunity to consider various approaches to the task. As they discuss the stimulus, they should explore the nature of the stimulus itself, the purpose of the written reaction to the stimulus, the intended audience, the format, and, perhaps, other kinds of information they may need to complete the task effectively. Third, this stage gives students time to reflect on the task before actually committing their thoughts to paper. In school we seldom grant this necessary period for reflection. Consequently, this stage serves many purposes simultaneously and should be considered one of the more important steps in the instructional process. The teacher should note, however, that while we have referred to a group of students, in our discussion, the reaction to the stimulus may be conducted in small groups, or individually, depending on the nature of the stimulus and the goal of the writing task.

Rough Copy. After considering ideas and alternatives and gathering necessary information, the writer is ready to draft ideas. We emphasize "draft" and "rough" because we believe learners should have the opportunity to experiment, to see what their ideas look like on paper before they are required to submit them for evaluation. Frequently, students move directly from stimulus to final copy. The rough copy stage, however, allows them time to discover what information they may lack, to organize their thoughts more coherently, and to locate more exact words to communicate their ideas. At this time writers should be more concerned with expression and organization than with spelling and punctuation. The mechanics of writing are usually developed during the editing or "final copy" stage. If stressed too early, both expression and organization will be inhibited.

Sharing. This is another step which is usually omitted in the classroom. Because of time and logistics many teachers find it easier to have students move directly from the rough copy to the final copy. However, this denies learners the opportunity to obtain direct feedback on their ideas, organization, and expression before evaluation. Few writers submit papers for publication without some kind of preliminary discussion of the draft. Not only should students learn how to listen to a peer's reaction to their efforts, but they should also learn how to give helpful criticism of another's writing. Some direct instruction from the teacher may therefore be required.

For example, distribute an average work from an anonymous writer (preferably one completely unknown to students, or your own example) and ask for the class reaction. As the class reacts, record the kind of comments made and questions raised. Then discuss the process of reacting to the paper with students, considering the questions raised and general comments made, especially about expression and organization. An informal chart could then be developed with the class for use in the initial sharing sessions.

The sharing may be conducted in a variety of ways. Some teachers, for example, have students read their works to the entire class. Others work with students individually, refining

papers until satisfied. We suggest that students initially share their papers with partners, one reading his or her own paper aloud while the other listens. This method is the least threatening and encourages the writer to discover weaknesses through reading aloud. The next time they share, students may read each other's papers, looking for specific areas of concern, such as organization. Finally, they may work in small groups, refining papers until the work communicates exactly what the writer intends.

Some teachers have had difficulty during the sharing stage because they have not planned sufficiently and have expected students to share automatically without guidance or training. Even after some preparatory work such as that described, many students require continued direction and support. Some may even need to work directly with the teacher. The sharing stage allows this opportunity, as the teacher may work with small groups of students while the rest of the class is sharing with each other.

In the chart which follows we have indicated an interactive relationship between sharing and rough copy. While the explanation of the composing process implies a linear sequence of events, in practice students should be encouraged to work back and forth among the early stages, especially the sharing and rough copy stage. As they discuss their work with others and acquire more information, learners should also modify the rough copy and share it again until they are completely satisfied.

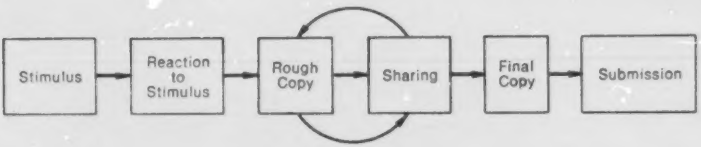
Final Copy. Once the writer has modified the copy sufficiently, she/he writes the final version. During this stage the writer refines the illustrations, corrects all spelling errors, and proofreads the work for all mechanical errors. At the end of this stage, the work should be ready for the intended audience.

Submission. This is the final step in the instructional process and is usually taken for granted. We believe it is an important step, however, and one that should not be considered lightly. Having worked through all the previous stages, the writer has, hopefully, refined and edited the work so that it represents the best effort and communicates to the intended audience exactly what the writer wants. If the work does not fulfill these two criteria, perhaps it has not reached the final stage. In this situation, the work should be refined further and resubmitted.

Once a work has been submitted to the intended audience, the writer has lost control over it. The words and organization must stand by themselves because further refinement is impossible.

For example, once an author's manuscript has been printed and reaches its intended audience, it cannot be brought back to refine the ideas, alter the organization, or correct the mechanics. In school we seldom acknowledge this fact of writing. Rather, teachers read compositions, correct them, and sometimes ask students to rewrite. Outside school, students will not have that opportunity. If possible, the writing situation should be realistic. The intended audience will not be the teacher; consequently, the work will have to stand on its own merit without any verbal explanation of what the writer "meant to say" or any excuses for omissions.

INSTRUCTIONAL COMPOSING PROCESS



In this text we have divided technical writing into three general areas: business writing, report writing, and scientific writing. The three distinctions show two concerns: logical progression from personal writing to impersonal observation and ease of implementation in the curriculum by different classroom teachers. Under the heading business writing, we have included the kinds of writing a student would use when applying for a job, communicating with the business world, or sharing opinions with the community. In most of these instances the student is using the self as the primary source of information and is concerned with presenting a reliable picture of his/her abilities or opinions.

Under report writing, the source of information moves from the self to some process or topic which the student needs to communicate to an audience. The reports in this section include giving directions, writing memos, writing a process report for the general public, proposals, and research reports. Although opinions are expressed about the topic, the topic itself is usually something external; the focus is on the topic rather than the writer.

In scientific writing the emphasis is twofold: on objective reporting to a specialized audience concerning something the writer has observed, and on clear explanation of scientific subjects to a general audience. Although some opinion is given, the focus is on careful, factual description of a specific process and results. The opinions of the writer are based on observations during the process and are supported by facts recorded during the observations. In scientific writing the specialized audience sometimes possesses more knowledge of the subject than the writer does, so the vocabulary is sometimes highly specialized and exact.

In addition to the logical progression from personal to impersonal writing, we have found that these areas lend themselves to instruction in the high school curriculum. First, teachers at different levels and in different content areas may be interested in some types of technical writing and not in others. The categories we have delineated allow teachers to select the types of technical writing most appropriate for specific classes and grade levels. Second, from our experience with teaching written composition we have found that productive writing activities may be organized into these categories easily, providing realistic writing experiences within larger contexts rather than isolated exercises.

Within each general category of technical writing, we have provided an explanation of the category with specific examples to illustrate our working definitions, a listing of particular skills which are required for writing in that area, and sample instructional activities. Although many view the teaching of technical writing as primarily a community or technical college course, we have found that teachers at all levels work with technical writing, albeit under many other titles. Consequently, we have provided a variety of instructional activities at several different levels, some of which may be more appropriate for some grade levels than others. All the activities should be modified for specific classes.

Throughout the introduction of this text we have stressed realistic situations and the composing process. In the discussion, however, we have illustrated our comments with short, sometimes artificial, exercises for students. These exercises should be used to illustrate concepts in business writing, report writing, and scientific writing. They should not be used as the basis of evaluation or as the only implementation of ideas. Along with the instructional exercises, we suggest that teachers use experiences similar to the "Student Activity" provided at the end of each chapter. In these activities we have suggested ways for

students to practice the concepts discussed in the chapter in realistic situations, using the composing process as a framework.

We have directed all our thoughts in this text toward the teacher. We consider the student indirectly through the teacher's implementation of the ideas. In addition, we have limited most of our discussion and activities to teaching technical and scientific writing, neglecting other kinds of writing such as narrative. For teachers interested in instruction of general composition, we have listed some texts and sources implementing the composing process in other areas of writing. (See Appendix 4.)

CHAPTER 2
BUSINESS WRITING

Throughout much of our school careers we focus on writing for the teacher, analyzing literary works, recalling historical events, expressing our feelings about school lunches, and so on. Few students have the opportunity to learn how to communicate with the business community and the world at large. Consequently, most people outside education view schools as isolated from the world, as ivy towers with little practical input for the future adult in society. Most teachers have fought this criticism, claiming they are educating the student to learn how to adapt in a changing society and to discriminate between the "good" and the "bad." We are not suggesting that teachers abandon the search for values and education of process as well as product. Rather, we are attempting to bring process into a meaningful, realistic context.

In this chapter, we begin with resumé writing. Although writing a resumé seems trite and simple to many teachers, it provides the student with an opportunity to examine personal experiences closely from different points of view and in specific contexts. As part of resumé writing, we explore filling out application forms and writing letters of application. These three tasks are closely related to searching for a job, applying for extended educational opportunities, or simply telling someone else about one's experiences and abilities.

Then, we proceed to various kinds of business correspondence, including letters in search of information, letters of complaint, and letters of opinion. All types are important in our society if we are to interact with the world successfully. To have control over our lives, we often have to communicate our feelings and needs to others. Usually those with whom we communicate are unknown to us. Therefore, many times we have to write to gain

respect for our opinions and a response to our needs from a particular audience. The business letter is a vehicle for this kind of personal communication within society.

RESUMÉ WRITING

The resumé provides a good introduction to technical writing because it calls for relatively simple writing skills, centers attention on important facets of technical writing, and, especially, concentrates on the individual as the source and topic of the writing experience. Since the resumé is short and often in outline form, the writer can focus on organization, language, and mechanical skills, such as spelling and capitalization, without much concern for sentence structure and paragraphing. Although brief, the resumé encompasses the basic elements of technical writing: accurate recording of experiences, concern for audience, delineation of purpose, and selection of format. Most importantly, the focus of the resumé is on the individual writer; there is little need for extensive research or outside reading. Every writer has ready access to information, regardless of ability. (See Appendix 1 for sample resumés.)

The writing of a resumé serves two important goals beyond preparing for the job search. First, by having students list their accomplishments and write them neatly in a resumé format, we are able to demonstrate many positive aspects of their lives which they had previously taken for granted. The process and the product help give the individual student a sense of worth. Second, this listing also helps students develop a positive attitude toward future experiences. As they consider the various kinds of positions in which they might be interested and list experiences they have had which are relevant to these positions, students may also envision additional activities or experiences which would be impressive to a prospective employer. In short, resumé writing may be viewed as a process of self-realization and self-evaluation with a direct, meaningful product.

TECHNIQUE

Since the content is readily accessible and the style uncomplicated, resumé writing allows both teacher and student to concentrate on the process involved in this type of technical writing. This introductory experience may be followed by other technical writing situations requiring more effort for content and style.

Recording the Experience. As with all writing, the writer must begin with some experiences or perception to share with an audience. In resumé writing the experiences may be broken into three areas: personal information, educational background, and work-related experiences. The first type of information includes such items as name, address, telephone number, and marital status. The second area covers all educational experiences the student has had, including extra academic work outside school. The latter might encompass classes taken during the summer or work at a local museum or music conservatory.

The novice writer often overlooks the third area, work-related information. This area, however, may determine the success of the resumé in securing an interview for the position, especially if the educational experience is limited or traditional. Work-related information includes those experiences of the writer which might have relevance for the specific position under consideration. This a nebulous area, since we are often unaware of the importance of our activities.

Have students keep a loose-leaf notebook journal in which they record all their experiences under the three categories described. Students may use these journals as sources of ideas throughout the unit.

In addition to helping students become aware of the significance of these activities, teachers should also help students select the appropriate words to heighten the importance of each activity. For example, if a high school student worked with a younger friend in an academic area, the experience could be described as "worked with," "tutored," or "taught," any of which might be the most appropriate, depending on the audience.

Using activities listed in the journals, have students list alternative verbs to heighten the significance of the activity. As a help to students, circle some of the verbs which could be rephrased and have students list two or three alternatives to each circled word.

Audience. The audience of the resumé is usually unknown until the writer has a specific position in mind. At that time the resumé is often modified for the particular job opportunity. Although the teacher may discuss resumé writing in general with respect to several different audiences, the student's final project or resumé should have a particular audience. This audience provides the basis for deciding which experiences should be included and which could be omitted.

In a full group discussion have students cite prospective audiences for resumés. They may give examples such as summer camp directors, parents of children requiring tutoring, service station managers, higher education admissions officers, etc. List the examples on the board and discuss the kinds of experience most significant for those audiences.

Have students work in pairs selecting a particular audience and listing appropriate experiences for that audience. After listing, have students rank the experiences by importance to the prospective position. If different pairs selected similar audiences, have them compare the experiences and their rankings.

Purpose. Closely related to the audience is the purpose for which the resumé is written. The object of the resumé is to give the reader a positive sense of the writer's competence and reliability in regard to a specific position. Consequently, the writer should stress strong experiences which demonstrate these attributes, including all relevant activities and eliminating those that are distracting.

Provide students with a list of several experiences which they might have had. The list could be a compilation of activities cited in their journals. The activities should reflect a wide range of interests, with appeal for different audiences. Then provide two different job descriptions from the newspaper (e.g., service in a fast-food restaurant and summer tutoring) or a job description you have written. (See Appendix 1.) Discuss the skills pertinent to each type of job with

the whole group. Have students select five experiences which would be appropriate for each job. Have them discuss their selections in small groups and arrive at a single list of five for each job.

Format. The resumé provides a good introduction to technical writing because its format is simple yet extremely important since the reader will form a first impression of the writer on the basis of the appearance of the resumé as well as its contents. The reader will be looking for specific information and will probably be reluctant to spend much time searching. Consequently, the writer should attempt to view the product from the reader's point of view. What kinds of information should appear first? How important are the "mechanics" of the resumé? How important is the visual impact, including margins, spacing, and indentations? Should the resumé be typed? What kind of paper should be used? What is the best order of presentation of experiences? While different writers use various formats, all attempt to take these questions into consideration.

As students read each other's resumés, have them role-play, reading as though they were prospective employers. Have them list the experiences which they consider most important as prospective employers. Then have them list the experiences in the resumé. During the sharing they should also discuss the visual impact of the resumé.

From the initial gathering and recording of experiences, through the selection and arrangement of detail, to the final production of copy, the purpose of the resumé is to give a positive impression of the writer to a prospective employer. Editing errors, such as misspelled words, typographical errors, inconsistent spacing, and usage mistakes, convey the message that the writer is careless and may not be competent for any position. In this way all the care and effort taken throughout the process may be overshadowed by a few relatively minor errors which could have been remedied by careful proofreading. This task is a skill which

many teachers take for granted and do not bother to teach, although it is much in demand. As with any other writing skill, however, students need practice and training before they can proofread effectively.

Distribute a hypothetical resumé with several small editing errors. Ask students to read it silently, underlining each error they notice. Then, ask them to read the resumé aloud (softly) and mark additional errors. Discuss the errors and the two procedures for locating them with the whole group.

JOB APPLICATION FORMS

Closely related to resumé writing is filling out job application forms. While writing a resumé demands more complex skills of organization and arrangement of information on the page, the highly directed responses called for on job application forms merit separate discussion. Students have already evaluated their experiences, developed a suitable vocabulary to describe them, and discovered the audience for reporting them as they have perfected the resumé. Filling out a job application allows them to concentrate on accuracy, neatness, and demonstration of their ability to read and follow directions exactly. The same skills will be demanded later at a more advanced level in report writing and scientific writing; it is therefore useful to establish these values early in a simple form. Since the appearance of the completed form ranks high, students need to have two copies of applications, one to serve as a rough draft and one to be submitted. (This is also a good place to emphasize the importance of keeping copies of all materials mailed to others.)

Finally, many job applications request references. This requirement sometimes poses problems for students, as they have seldom considered the implications of the request. Not only should they realize who knows them well enough to act as a reference, but they should also consider the potential reference in regard to the specific position and the impression the reference will have on the potential employer.

Duplicate a sample job application form using a fictitious employer. Using an overhead transparency discuss the specific elements of the form, stressing directions such as "Print only," "Last name first," and "Do not write in this space." Have each student fill out a copy of the sample form using information from the journal and resumé as necessary. Finally, have students work in pairs discussing problems with following or interpreting the directions. Provide help where necessary.

BUSINESS LETTERS

Of all the writing a student will do, the business letter is probably the most frequently used and the most important written communication. As a citizen, a taxpayer, an employee, a correspondent, the student will have to make needs and ideas known to someone who is absent. Because of the importance of the communication and the potential for future reference, a telephone call will not suffice; the medium will have to be a letter.

Often the letter will provide more than its contents; it will also introduce the writer to the reader. From this correspondence the reader will form an impression of the writer as an individual as well as a judgment of the ideas contained in the letter. In short, the importance of the business letter transcends mere transmission of knowledge. It incorporates awareness of the personality of the writer as well. Consequently, the writer has to take care with the entire process—content, style, and visual impression of the letter. While we often teach the form of the letter, we frequently neglect the importance of the manner in which the content is presented, including vocabulary, sentence structure, and design. Perhaps more instructional effort should be placed on the presentation and content than on form as these elements are the life of the letter and a reflection of the writer.

TECHNIQUE

The characteristics of a business letter are those of any other piece of expository prose: clarity, brevity, and coherence. The writer records a need or ideas for a specific audience and ex-

presses his/her purpose explicitly in the letter. Like an essay, the first paragraph of the letter states the thesis. The second and subsequent paragraphs give supporting details of ideas presented in the first paragraph. The final paragraph provides a conclusion or solution. Unlike some forms of exposition, however, the letter is usually designed to yield a single interpretation of meaning with a single reading. Hence the writer should use the clearest, least ambiguous language appropriate to the topic and purpose.

Recording the Experience. Perhaps the hardest part of letter writing for students is discovering the need for such an activity. Few have had occasion to write a business letter, and they are just beginning to enter an adult community that transacts much of its business by letter. For many students, a quick word to the principal between classes, or a telephone call, has been sufficient to redress grievances or state opinions. Many opportunities for correspondence have been overlooked, however, simply because of student failure to realize they existed or failure to take advantage of them at the appropriate time.

Have students cite situations for writing letters, such as searching for a job, stating a complaint, seeking information. Under each situation ask students to list occasions when they could have written a letter.

Opportunities for writing letters arise more frequently than most of us would admit. This holds for students as well as adults. However, many teachers fail to seize upon such opportunities and instead create artificial situations for learners. Rather than requiring an entire class to write the same kind of letter simultaneously, perhaps it would be more realistic and educationally profitable to help students recognize opportunities and write letters for specific purposes. For example, in one class some of the book club orders were confused. The teacher asked students who did not receive their books and those who received incorrect selections to write the book club requesting correction of the error. Only those immediately affected wrote letters. This

procedure was more meaningful than having the entire class write or, as is often the situation, having the teacher write.

Introductory remarks in a letter are very important. They serve two functions simultaneously: to catch the reader's interest and to state the purpose of the letter. Too often we use trite phrases such as "In receipt of yours . . ." which not only fail to catch the reader's interest but also fail to communicate the purpose of the letter. Such phrases appear too often because letter writers are wary of stating their own thoughts and feel more comfortable relying on those of others. One of our major goals in teaching letter writing should be to help students frame their ideas in their own words and style, capturing the reader's interest quickly and stating the purpose succinctly. If the purpose is clearly stated, the reader's interest should be aroused.

Have students write the opening sentences of a letter, concentrating on stating the purpose accurately and briefly. Have them read their openings to each other in small groups or pairs. After each writer has read the opening, the listeners should restate the purpose of the letter. If there is a discrepancy between the writer's purpose and what was communicated, the group should discuss ways to improve the opening.

Audience. Although the name or title of the audience of a business letter is usually known, often the reader is not known to the writer personally. Therefore, the writer has to picture the audience on the basis of position and the purpose of the letter. Even with so vague a definition of the audience, the writer should attempt to view the message as the reader would. The more specifically the student can identify the audience, the more likely the letter will receive careful attention. "Dear Ms. Maloney" is more personal and will probably be read more carefully than "To Whom It May Concern." Finally, the writer should always attempt to visualize the audience as a person with feelings and should use words and phrases which appeal to these feelings in a positive way. In short, the letter should be courteous and respectful of the individual audience, yet direct and forceful in making its point.

Prepare two letters about the same topic. One letter should be well written, using direct language and a clearly stated purpose. The other should use cliché phrases such as "To Whom It May Concern" and "In reference to the aforementioned article . . ." Have the class read each letter from the point of view of the intended audience and discuss which they feel is the better letter and why. During the discussion highlight words and phrases which have a positive or negative impact on readers.

Purpose. The business letter is seldom written for the writer to discover more about himself or herself or merely to express feelings in a creative manner. Rather, the business letter seeks a specific reaction from the audience. The successful letter will bring an interview, a replacement part, an explanation, a contract, some kind of active response from the recipient. The identification of the audience response is actually part of the recording of the experience, since all the ideas presented in the letter should be aimed at eliciting that reaction. Furthermore, the purpose of the letter dictates the audience as well as the experiences cited.

Give students a hypothetical situation. For example, "The road in front of your house has several large potholes, and it is difficult to drive on it. You have already damaged your tires as a result of these potholes." Then discuss several purposes for writing a letter about the problem (e.g., to have the potholes repaired, to bring legal action against the city for reimbursement for new tires). Divide the class in half and have each group design a letter for a different purpose. Before actually writing the letters, each group should list appropriate experiences and a specific audience for each purpose.

Format. Standard forms of business letters are available in most high school textbooks. Samples are included in Appendix 1. A few comments are in order, however. Most companies adopt a company style and format that is uniform throughout the com-

pany. Students need to learn that no single style is absolutely "right," but, once they adopt a style, they must be consistent throughout the letter. If students use block style for the inside address, they should use the same style for the return address and addresses on the envelope. Because the audience judges the writer's case on the letter alone, the writer must demonstrate the importance of the communication by attention to details of correctness and appearance. If the writer sends a well-written letter on a sheet torn from a spiral binder, the reader is likely to see the case as hastily conceived and immature. Students should write all letters on unlined paper, typed if possible. If typing is not possible, then the letter should be written in ink. The final copy should be made from a finished draft on which all corrections have been made. Students must also make copies for themselves, preferably a carbon or photoduplicated copy of the original.

The style of the letter is at least as important as its design. First, contrary to popular belief, the letter should not always follow a formal, third-person format. Elaborate circumlocutions to avoid "I" distract the reader and often cloud the purpose of the letter, causing an unwanted reaction. Students should be encouraged to write naturally, using the first person when referring to themselves. Second, the style should be direct, without clever rhetorical questions or self-indulgences with the language. While such digressions may amuse the writer and friends, they often serve only to anger the audience, again making the appropriate response difficult. Finally, the writer should focus the letter on the specific issue. Elaborate narrations of the history of a problem or the consequences of inappropriate action that are not germane to the issue or are outside the scope of the reader's capacity are unnecessary. The writer should, however, provide enough background on the issue to fully inform the reader of the situation so that he/she may take appropriate action. Although the purpose of the business letter is to achieve a practical objective, the style should also serve to establish a rapport between writer and reader since the letter provides the major source of communication and interaction between them.

TYPES OF BUSINESS LETTERS

There are several types of business letters, depending on the purpose of the communication. We have included four types which the high school student may be called upon to use: inquiry, application, complaint, and opinion.

Inquiry. The primary purpose of the letter of inquiry is to obtain specific information. The statement of purpose appears in the first paragraph, indicating exactly what the writer desires from the audience. If it is necessary to explain why the writer is addressing the particular audience or to refer to previous correspondence, the letter should begin with that explanation or reference. The middle paragraph asks the specific question of the writer. If the letter contains more than two questions, they should be arranged in a numerical list for ease in reading and replying. The final paragraph briefly establishes the goodwill of the writer. The tone of the letter of inquiry is courteous but efficient since the transaction is specific and highly directed. (See Appendix 1.)

Have the class compose a letter of inquiry while you write it on an overhead transparency. Then, have another class read the letter and discuss what the writer is requesting and the overall tone of the letter. During the discussion of tone, students should indicate how they feel about the letter and the writer. Discuss the response with the first class, and review the letter for possible areas of improvement and clarification.

Application. Through the letter of application the writer is presenting himself or herself as a possible candidate for a job. This letter will be the prospective employer's first impression of the candidate; it is therefore important that it depict the writer as a valuable asset to the employer through both its content and its style and format. The first paragraph states the source of information about the job and expresses the writer's interest. The writer should be as specific as possible about the source of information, referring to specific individuals if appropriate. Interest in the job should also be stated specifically with an indication that the writer knows for which job he/she is applying.

The crucial paragraph is the second one. Here the writer expresses his/her unique qualifications for the specific job. While the accompanying resumé lists the qualifications, in the letter the writer should select and elaborate on those items that might make him/her rise above the competition.

The last paragraph should be positive but brief, indicating how the reader may contact the writer and when the writer might be available for interview. If the job warrants a more aggressive approach, the writer might offer to call the prospective employer at a later time. Some writers include a self-addressed, stamped postal card (not a picture postal card) on which the reader can indicate a time and date for interview. This provides the prospective employer with ease of response and demonstrates the writer's initiative. (See Appendix 1.)

Complaint. The purpose of any business letter is to produce a reaction. It is especially important to recall this purpose in the letter of complaint. Too often such letters degenerate into inflammatory vocabulary, carelessly defined problems, and illogical development, with the result that the reader either will not take any action or is unable to determine the kind of action desired. A courteous, firm tone developed from a clear perception of what the writer wants the audience to do usually produces the most effective results.

The first paragraph should state the problem objectively. The middle paragraph offers details and supporting evidence. The final paragraph establishes the writer's expectation that the reader will remedy the situation. If the writer really wants the problem to be alleviated, the reader needs some latitude for response. The obligation of the writer, then, is to state the problem accurately and to explain what realistic response the writer considers adequate. (See Appendix 1.)

Conduct a class discussion of actions or devices that have bothered students in the last week. Make a list of all ideas. They might include people who were rude, tools that failed to operate, etc. For major complaints discuss the nature of the complaint and the specific audience of a letter. Next, have the class write a letter of complaint to the specific audience. Then have students write individual letters of complaint to specific audiences responsible for the source of their own problem. Be sure to share replies to student letters to establish their effectiveness.

Opinion. The letter of opinion is related to the letter of complaint in tone and objectivity. The main difference is that the letter of opinion does not require a specific response. It is a statement of position and, unlike other business letters, may address a broad, mixed audience. A difficult concept for students to master is that an opinion may be strongly held and objectively stated and still may not convince everyone of the validity of the ideas. However, more people will be persuaded by reasonable, logical argument with adequate support than by derogatory comments about opponents of the opinion. The style of the opinion letter is similar to that of the argumentative essay with an introduction, logical development of supporting details, and conclusion.

Have students bring in letters to the editor from the local newspaper. As they read them silently, have them record their feelings about both the writer and the content. Then have them mark specific words and phrases which brought about some of their feelings. As a group, discuss the feelings and the words and phrases.

STUDENT ACTIVITY
BUSINESS WRITING

Project: Resumé and Letter of Application

The teacher should provide realistic situations in which students employ the concepts discussed in this chapter. This means more than just providing an audience outside the school; students have to see a need for the communication beyond the academic requirement. Consequently, culminating activities will be more complex than merely writing a letter or resumé; they may be conducted periodically after completion of instruction whenever real situations arise. The first step, however, would be to explore realistic contexts for writing by discussing students' lives beyond school walls. When have they wanted to complain about a missing part or broken component? Will they be searching for jobs in the near future? Different students will recognize opportunities at different times and should be allowed to demonstrate their competencies at these times. We have provided a sample procedure for working with business writing when situations arise.

Obviously, the most opportune time for writing resumés, job applications, and letters of application occurs when the student is looking for a job. Many need summer jobs for a variety of reasons. Although some have semi-permanent positions, others begin to search anew every year, while still others may be going to a different location where they might want to find a job.

Have these students discuss possible summer jobs in the geographical areas in which they will be living in the summer. List these positions and add more, if possible. Discuss the skills necessary for several of these jobs. Have individual students select jobs for which they feel qualified. For each job selected have the student list experiences which highlight his/her qualifications. Classify experiences under appropriate headings.

Have students work in pairs to share their resumés. The reader should take the role of the prospective employer and ask the writer questions about the resumé from that point of view. Students should realize that they are helping each other write the best resumé possible for a specific job opportunity.

Students should then incorporate appropriate suggestions and write the final copy of the resumé following a particular format, typing the copy, and editing carefully. The teacher should then read the resumé as another sample audience.

After finishing the resumés, students should write letters of application for the particular jobs they have selected. Before writing the rough copy, the group should discuss points to be included in each paragraph, the intended audience, the purpose, and possible formats.

After writing the rough copy of the letters, students should share them with each other. Readers should take the role of prospective employers, considering the content, style, and format. After discussing the rough copy, the writer should prepare the final version, incorporating appropriate suggestions, and should share it again with the teacher.

Once the resumés and letters of application are ready, students should send them to the prospective employers who are the real audience and the final submission of these communications.

CHAPTER 3
REPORT WRITING

Most of us write reports throughout our lives. As teachers we write memos, reports of activities, letters indicating student performance, formal proposals to school boards and governmental agencies and, of course, report cards. Students write reports for their teachers, and, if they have jobs, probably some reports for their employers. We have distinguished between report writing and business writing by the level of objectivity. In writing resumés and letters of inquiry, complaint, or application, both the source of information and the content are personal. In report writing the source of information and the content are usually outside the writer. The report may contain personal opinion, but this opinion is based on the facts of the experience about which the writer is reporting. In the type of business writing we have discussed, on the other hand, the information is often subjective, based on logic and personal experience. Perhaps the most relevant distinction is that reports concentrate on presenting facts and interpretations of facts while business letters and resumés present the writer's ideas.

Herman M. Weisman has provided a good working definition of a report as "organized, factual, and objective information brought by a person who has experienced or accumulated it to a person or persons who need it, want it, or are entitled to it." (19:98) In this definition Weisman has captured all the essential elements of the report, and by examining these elements we can help students write effective, productive reports.

TECHNIQUE OF THE REPORT

Weisman's definition of a report has particular bearing on two of the four elements of technical writing (recording the experience and audience) and indirect implications for the other two (purpose and format).

RECORDING THE EXPERIENCE

As indicated in the definition, the report focuses primarily on facts. These facts may be the result of searching literature for information, personal observation, or experimentation. Any opinions given by the writer should be in direct relation to the facts of the situation. Consequently, the major thrust of recording the experience should be to accumulate an accurate record of the facts.

When we ask students to search literature for facts to support ideas, we often fail to give them practical assistance in this effort. Usually we suggest various approaches to taking notes and list some sources for them, but often we then assume students will be able to cull the relevant facts from the vast quantity of statements they will encounter. Both kinds of assistance are necessary if the learner is to find the appropriate facts and record them accurately for later use.

One approach to recording information for a report is to use 5 x 8 or 4 x 6 index cards. Although many students consider using such cards a waste of time, those engaged in research on a regular basis find cards the most efficient way of recording data, filing it, and recalling it later. Cards allow the researcher to restructure the notes easily for the actual writing once facts have been gathered. In addition, they also save a great deal of "paper shuffling" in search of a particular note. These index cards, however, are effective only when the researcher has jotted down all the relevant information and only the relevant information. For example, a note card should contain the author, article, and page number, the particular note, and a general category into which the particular note might fit. (See Appendix 2.) In addition to note cards, the researcher should also have bibliographical cards for each source. We have found it useful to use 3 x 5 cards for the bibliographical cards to prevent them from becoming confused with note cards. Each bibliographical card should follow the particular format requested by the teacher and possibly contain some additional notations to the writer for future reference. (See Appendix 2.)

When citing sources for students, the teacher should try to include many sources beyond encyclopedias and the *Readers' Guide to Periodical Literature*. In addition, the learner should be encouraged to look through two or more books covering the same or similar material, paying particular attention to their bibliographies. The student should also consult specialized

reference books such as bibliographies and yearbooks published by professional organizations. Before recommending sources, however, the teacher should confer with the librarian for availability of sources as well as for other recommendations. In addition to books, we also suggest that the teacher explore the availability of other kinds of resources such as microfilm, microfiche, filmstrips, audio tapes, and movies. Students should learn to tap as many relevant sources as possible for a report.

Once they have located sources and have begun to read them, learners need to know how to actually record the information on the index card. Many are wary of recording exactly what the author has said, having been taught throughout school that using someone else's ideas is wrong. However, the result of this training is that students then use the ideas in paraphrased form without acknowledging the original author. Consequently, we suggest that students record quotations when they fit the idea best and summary statements when only the general idea of the source is relevant. In both cases students should indicate page number or numbers on the card and acknowledge the author in the final report. When writing the final report, students should use a direct quotation to support major ideas and should use original statements for the bulk of the report.

All this detail is important to the logistics of gathering information from literature, but it is secondary to actual interpretation of the information. Few secondary school teachers give learners practice with this activity during the report writing unit. Although most students have been taught critical reading skills at other times, many fail to make the transition between those learning experiences and the present one of recording information. To many, merely recording information from an article seems easy. They do not realize that different readers may read the same article and derive different interpretations and different supporting notes.

After the students have decided upon topics for reports but prior to actually beginning the search of the literature, give the class a short article typical of the kind they may encounter in their search. Using 3 x 5 cards, students should record all the bibliographical information. Then using 5 x 8 cards they should record all relevant notes. On one 5 x 8 card, each student should write a few sentences summarizing the author's opinion on the topic.

Then, have students work in pairs, comparing their summary statements, the notes they selected as most important, and the bibliographical information. They should list discrepancies between their material on a separate paper.

Finally, as a full class discuss some of the discrepancies. Even if few differences appear, discuss the possibility of differing interpretations and the need to be sure to quote the author in context with the author's general thesis.

A second source of information for a report is direct observation. As with the search of the literature, students must learn to record their information accurately and objectively. We are all biased in our perceptions because of our backgrounds, interests, and opinions. Before recording information, we should recognize these biases and how our own perceptions may be influenced by them. Again, supporting facts should be put into context with the overall event or events. Students should not take isolated facts to support a preconceived conclusion, but rather they should form a conclusion based on facts and use relevant facts to support the report.

Show a short film depicting an event (such as *Battle on Michigan Avenue*, an account of the Democratic Convention in Chicago in 1968 and the concurrent demonstrations). Have students use 5 x 8 cards to record facts and subordinate events in the film. When the film is over, have each student write a summary of the general event in a few sentences. Next, have each student list four or five of the most relevant notes taken about the film.

Then, have students work in pairs, comparing summary statements and notes. They should list discrepancies and differences of opinion. While in pairs, they should try to discover why they listed different "facts," if they did.

As a full class discuss differences of opinion about the entire event and then about the supporting "facts." As part of this exercise, discuss potential influences on perception, such as biases and preconceptions about what "ought to be."

An important skill in observation of events is the ability to notice details. Usually, we view the world generally, taking in much information and forming impressions about life around us by those general impressions. When reporting an event, the observer should cite as much "objective" detail as possible to support conclusions.

As an out-of-school-assignment have students carefully observe another person performing an interaction with someone else. For example, they may observe someone trying to return an item to a store, or a salesperson trying to convince a customer to buy a product. During this observation, the student should note as many details about the person as possible, such as facial expression, hair color, height, clothes, vocabulary.

The next day in class have students work in pairs describing their individual and general conclusions about personality, social class, and physical structure, based on their observations. The partner should jot down instances where the observer has made judgments without supporting details or has let preconceptions influence conclusions.

A third source of information for reports is experimentation. Although this is a major area in report writing, we have incorporated it in the chapter on scientific writing since it involves the use of scientific method in gathering the information as well as in its analysis and reporting.

AUDIENCE

As Weisman stated, the audience for reports includes those "who need it, want it, or are entitled to it." (19:98) Since it is one of the major factors in determining the type of report to be written, audience will be considered in greater detail later. (See Chapter 4.) In general, however, the teacher should help students analyze their potential audience. First, we have those who need the information in the report to pursue their own activities. This is the most practical audience, as they will evaluate the information for implementation. Consequently, details and conclusions must be especially accurate and clear because success or failure of the implementation may depend on the report.

The second audience encompasses those who want to read the report. This nebulous audience may be considering implementation of information or may be merely curious about the ideas. In the latter case the writer must take into account the level of sophistication of the audience relative to the particular topic of the report. If the audience is very knowledgeable in the area, the writer may use specialized vocabulary and may make some assumptions about common understandings in the field. If, on the other hand, the audience is unsophisticated in the field, the writer should avoid technical vocabulary without definitions and should not omit steps in a process or argument, assuming the audience will be able to fill in the gaps. If the audience is mixed, the writer should aim toward the less sophisticated.

The third audience includes those who are entitled to it, usually superiors or those who have contracted for the report. Again, the level of sophistication of the reader should be determined before submission. For a superior in a field, usually we assume a high level of sophistication and we can write accordingly. If the writer has been contracted for the work, however, readers are often unsophisticated in the particular area and therefore require more detail, explanation, and general vocabulary.

Give students a list of facts to be included in a report. Facts may include items such as the following:

> A peaceful demonstration for rent control—500 people participated; 32 police officers were on patrol in the area. Another group of 50 people tried to stop the demonstration. A fight broke out; 25 people went to the hospital; 2 police officers were injured and sent to the hospital. The conflict lasted three hours; the crowd went home at 10:30 P.M.

Divide students into groups of two or three. Each group is to write a report of the incident for each of the following audiences: the police commissioner (see Appendix 2 for sample Police Report), the local civil rights group, and the newspaper. Give each group some "technical" words and phrases such as *disperse, command post, perimeters, crowd control procedures, field intelligence, precipitate, liaison among agencies, skirmish line.* Then each group should discuss differences in the three reports such as vocabulary, details used, conclusions, and characteristics of the respective audiences which influenced their choices of words and details.

PURPOSE

Usually a report has two main objectives. The first is to present details of a search, experience, or experiment objectively and accurately to the audience. The second is to convince the audience of the validity of the conclusions based on the details. Both objectives are important. If the first objective were its only purpose, the report could consist of the list of details, letting the audience form its own conclusions. However, the writer will invariably make subjective decisions in selection and presentation of the details and conclusions drawn from those details. Consequently, the second objective is to convince the reader that the report is correct.

To fulfill this purpose, the writer must take into account the material, the audience, and the format. A particular audience will accept one language and format, depending on its point of view, while it will not accept others, regardless of the actual validity of the content. Thus, the writer should strive to achieve both purposes; accurate, objective presentation of details and conclusions and appropriate style and format to convince a particular audience of the value of the repo[illegible]

FORMAT

"There is no universal 'right' form to clothe all reports. 'Form,' a learned colleague once said, 'is the package in which you wrap your facts and analysis. Choose (or design) a package that is suitable for your material, your purpose, and your reader.'" (19:100) Reports vary considerably, depending on the specific situation. Later, we will explore a few of the several types of reports, but teachers should constantly remind students that the particular format is related directly to the content, the audience, and the purpose. A report on the cost of a house, for example, might be a brief memo to a subordinate in a real estate office, a notation in a letter to a relative, a colorful brochure to a prospective buyer, or a detailed letter to an insurance adjuster. While it is often easier to stress "standard" formats, teachers should strive to teach the interaction of all the elements, changing one when others are altered.

Divide students into groups of three, and give each group a list of details such as the following:

> House for sale, four bedrooms, asking price is $65,000, seller will take $60,000. Attached garage, screened-in porch; close to public transportation; needs new plumbing throughout. Owner must sell as has new job in different state. House worth $70,000, new plumbing will cost $2,000; in-ground swimming pool; two-story colonial.

Students should indicate which details they would include in a report for each of the following audiences: banker, prospective buyer, real estate agent.

After each group has listed the details appropriate for each audience, have the groups match one of the following formats with each audience: memo, business letter, and brochure. Discuss what other details they would include in each report.

Writing reports and analyzing sample reports allow students opportunities to observe more than just the techniques of report writing. As they explore the various sources of information, audiences, and types of reports, students also come in contact with many professions previously known only superficially. Reports provide insights into some requirements of these professions which are usually ignored by media and other common sources of information about the world beyond the school. For example, in the Police Report (see Appendix 2) we can see the thoroughness and complexity involved in the reporting of an incident. We gain insights into the activities of the police prior to, during, and following the incident, demonstrating the potential ramifications of a request for a peaceful demonstration. With an understanding of tasks, we also hope students will have a better understanding of the people performing the tasks. Ultimately, this may be the most valuable learning in the entire unit.

THE THREE D'S: DESCRIPTION, DEFINITION, DIRECTIONS

Technical and scientific writing call for clarity and exactness in description, definition, and directions. Whatever written format the information takes, the writer needs to master the "three D's" to produce usable information.

DESCRIPTION

Many students have written descriptions as a part of regular writing assignments. These assignments, however, have usually been literary rather than technical. One distinction between technical and other descriptions is the purpose. The goal of most descriptions is to create a dominant impression or feeling. Technical description, on the other hand, orients readers so that they can understand the explanation of process or function that accompanies the description. To evoke emotional response, the writer of literary descriptions carefully selects words and phrases with connotative overtones. The overtones are as important as the details. The technical writer, however, selects only those details that readers must have to visualize the subject. If the writer is explaining how to change the oil in an automobile, the description of the strap wrench should enable the reader to identify the correct tool, not show the writer's emotional reaction to the strap wrench. The technical description, then, should include the size of the wrench, the relation between its design and function, but not its color or heft unless they are important in identification.

Write on the board a list of objects and two uses for each. Ask students to describe one object with Use 1 in mind. Have students describe the same object with Use 2 in mind. Have students read the two descriptions aloud and discuss differences in details emphasized for each use. Are some details more important than others for a particular function?

EXAMPLE:	**Object**	**Use 1**	**Use 2**
	pencil	musical instrument	pincushion
	basketball	seat	weapon
	paper towel	bottle stopper	drawing paper

Although a technical description is organized according to the same principles used with other descriptions, some principles play a greater role than others. In a technical description the writer orients the reader in time or space; hence transitional words and spatial relationships are important. Since technical description relates directly to function, the writer must specify

the use of the object, as well as the appearance. If the object is unfamiliar, the writer will probably want to use analogies for quick recognition of shape, size, etc. While originality of description may be important in evocative writing, precision of description is the highest priority in technical writing.

DEFINITION

Technical and scientific reports often contain terms unfamiliar to the general reader or terms used in an unfamiliar way. Therefore, some instruction should focus directly on the words themselves. Work with writing concise and unambiguous definitions provides practice in reasoning and verbal precision that will be valuable to students in all their communications. It is useful to begin discussion of definition by giving students a formula for one-sentence definitions.

A *(word to be defined)* is a *(category to which the object belongs)* that *(characteristics that set this object apart from other objects in the category)*. Give students several words to define and ask them to come up with two or three categories which can be assigned to the word. (Example: A *ruler* is a *rigid strip of wood or metal* that is *marked off in units of measurement*. A *ruler* is a *measuring instrument* that *indicates linear dimensions on a flat surface.*)

Practice in writing sentences according to the formula allows students to concentrate on selection of precise language while providing a method for using the skill immediately. The teacher may reinforce this application by relating discussion of definition to a specific writing task. Technical definition, like technical description, is subordinate to the purpose and audience of the report which needs an object described or term defined. Often it is difficult to distinguish between description and definition. The teacher should not force distinctions where they are not obvious. The value of the instruction lies in the application of the skill, not in identification of the skill.

Using the list of objects and uses in an earlier illustration, have students write a description and a definition for each object. Discuss the differences between the two while acknowledging the similarities. Stress accuracy of information and clarity of statement.

DIRECTIONS

The major consideration in applying this skill is the audience. First, giving directions calls for seeing with the eyes of the audience. Second, more than most other forms of writing, a set of directions requires an audience who will use them. The audience knows less than the writer about the topic and has only the written instructions to follow; thus the user of the directions (the reader) will trust the writer's competence and will attempt following the directions exactly. Few writing tasks give student writers such responsibility. Some group exercises are helpful in sharpening the writer's awareness of the user's need for precise direction.

Pair students off. Give Clark a drawing of a simple image (stick figure, simple house, polygon, etc.) without allowing José to see it. Have Clark give José directions on how to draw the same figure by describing one line at a time without projecting an entire image (e.g., Clark should not say, "Draw a stick figure of a man with feet and fingers," but, "Draw a vertical line two inches long at the center of the page; place a circle approximately one inch in diameter at the top end of the line . . ."). Have José follow the directions exactly, without allowing Clark to see the resulting work until José has finished his drawing. They then exchange drawings and discuss the results.

The effectiveness of the directions is easily judged. The old excuse "Well, you know what I mean" is immediately proved wrong when the reader cannot follow the writer's directions.

Thus it is important to give students several opportunities in the writing process to share the work with different audiences who will try out the directions.

Give a drawing of a simple figure to half the class. Have the group write directions on how to draw the figure and give the written directions to the other half. Next, have the second group draw the image from the written description, following directions exactly. After the drawings are complete, have writers work with the drawings to discuss differences between finished products and the original. Written directions should be revised to overcome confusion.

Since few people read directions through before following them, the writer must organize material so that the reader will be able to follow instructions step by step. In most cases introductory paragraphs giving an overview of the purpose and context of the directions and a list of materials needed help the reader to understand the overall task. Then the writer can proceed with the detailed steps. As students refine their drafts of directions, they will probably add to the list of materials. To insure inclusion of all materials, the introductory sections should probably be written after the directions themselves have been perfected.

Since it is often difficult to "tell" without "showing," students should be encouraged to use diagrams to clarify more complex written directions. Diagrams do not substitute for description and explanation, but they can provide a necessary supplement. Each diagram should be numbered and labeled underneath and should appear at the appropriate place in the text, preferably close to the corresponding written text. Drawings do not have to be sophisticated or complex, simply clear and accurate. In some cases, students should be encouraged to photocopy existing diagrams when appropriate. They must, of course, footnote such materials, including those used as sources for their own drawings (e.g., "Adapted from . . .").

Since the technical writer prepares directions as a numbered list of commands, a unit on directions is therefore a good place to do battle with the passive voice. Revision of sentences which

are rhetorically more complex than commands to avoid the passive voice requires composition skills more sophisticated than those many students possess. However, the imperative mood is familiar to students and natural-sounding in directions. Students can usually convert "The lever is returned to START position" to "Return the lever to START position" easily. Thus, writing directions also helps students become aware of stylistic considerations as well as the accuracy of detail.

An extreme example of detailed directions would be those written for the mentally retarded where every step is explained with great care. Kits with such directions might be available in a learning resource center. If they are not available, perhaps students would be interested in creating such a packet for the community.

Although we have stressed written directions, students should realize that some directions are presented more effectively visually and verbally. Tying knots, for example, is very difficult to describe with words alone but becomes more comprehensible when the verbal explanation is accompanied by visual illustrations of the process. Indeed, in many instances visual illustrations could communicate directions without the verbal support while the converse may not be true. Writing directions, however, still serves a vital role since it allows one to review the steps in a procedure carefully to be sure each move is accurately expressed in language that the intended audience can understand. Ultimately, the student should select the best medium for conveying directions to the audience most effectively.

Prepare a list of activities and have students identify the audience and the medium (visual or written) for each. Stress the importance of choosing the medium appropriate to the subject and audience.

TYPES OF REPORT WRITING

Report writing covers a very extensive field. In this chapter we have selected only a few types to demonstrate the varieties of reports students may encounter, while providing specific directions for those which they will probably write most often.

MEMO

The memo is a brief report, normally one page, directed to an audience of peers, to people responsible to the writer, and occasionally to superiors. The memo announces a meeting, gives brief directions, describes a product, etc. Its usual purpose is to give information about a specific subject in a form that is quickly read and remembered. Sometimes a memo is used to reinforce information given orally and to provide a permanent record of that information.

Most organizations use a printed form which has space at the top of the sheet for the name of the recipient and the subject of the memo. The writer arranges the body of the memo so that the reader can quickly see the essential information. If a meeting is announced, for example, the time and place might be set off from the text or underlined in the text so that the reader's eye takes in these facts quickly. If the memo lists a series of tasks to be performed, the tasks are presented as a numbered list. (See Appendix 2: Memo and Police Report.)

Differences between a business letter and a memo result from the characteristics of the respective audiences. While the audience of a business letter is outside the writer's organization, the audience of a memo belongs to the same organization as the writer. The writer of the memo and the audience share a common fund of background information, then, that the recipient of a letter often must learn from an introductory paragraph. Since the reader belongs to the same group as the writer and shares the group's goals and purposes, no concluding paragraph establishing the "goodwill" of the writer is necessary. In short, the memo is analogous to the middle paragraph or paragraphs of a business letter.

Have a student write a business letter to an external audience and a memo to an internal audience on the same

subject. Use a task like the following sample assignment to create a realistic situation:

> As program chairperson of the Hispanic Student Association, you are in charge of making arrangements for cleanup after the midsummer Feria at a neighborhood park. Write a letter to the director of city parks explaining your cleanup plans. (The director has required this letter before she will grant a city permit for the gathering.) Also write a memo to members of your committee who carry out the cleanup, explaining what they must do and when.

Compare the length, diction, and tone of the two texts to emphasize how audience and purpose affect form and style.

PROCESS REPORT

This report is similar to giving directions in that the presentation of ideas is sequential or chronological, but the purpose differs. The audience wants to understand how something works, not necessarily how to operate it. In the process paper the writer emphasizes theory, and in directions, application. Like directions, the process paper begins with an overview to establish the purpose and context of the process. The overview, however, is more conceptual than practical. The reader does not need a list of materials but may need a list of definitions of words that are unfamiliar or have specialized denotations.

Usually a writer composes a process paper to accomplish either of two purposes. The writer may wish to describe how a device is constructed or operates, or the writer may wish to report on a particular activity. In the first case, the writer describes the construction or function to an audience who wants to know the theory behind the construction or what will happen when the device is operated. For example, John may explain how a stereo speaker converts electrical impulses into sound by explaining the construction of the speaker and the relationship among its components. From reading this report the reader will not learn the steps in building a speaker but will understand what happens when the speaker is turned on.

In the second case the writer reports on what has already taken place to an audience who wants a record of what has happened. Process reports in this category are narrative descrip-

tions of a series of actions taken or observed. As with other types of writing, the writer will have to apply certain skills to make the report effective. Because of the nature of these process reports, three skills in particular stand out: transition, verb tense, person and voice. Transitions not only help the reader move smoothly from one idea to the next, but they also help the reader realize relationships among the various ideas or actions. Too often students insert transitions without considering the nature of the bridge, the relationships they are implying with the particular transition. For example, "The toilet overflowed *and* the soap bar fell into it" is different from "The toilet overflowed *because* the soap bar fell into it." Consequently, teachers should help students with both the transitional devices, such as words and sentence structure, and the inferences drawn from the use of these devices.

After students have written their first drafts of a process report, put a series of related but unconnected sentences referring to a specific activity on the overhead projector. Ask students to cite words they could use to connect these sentences. List the words on the board. Insert the words and discuss the relationships readers may infer from the use of particular words. Ask for other transitions that may not be appropriate for this series of sentences but could be used in other process reports. Have students list these words in their notebooks for future reference.

At a later time put sentences on the overhead projector again. This time ask students to draw connections among the ideas or steps by rearranging the sentences and inserting the words or phrases within the sentences rather than only at the beginning. Complete the class as before.

Verb tense, person, and voice are also important mechanical skills in writing a report. Since the report is an objective narrative of a completed action, the writer uses the past tense. Generally, learners should keep the grammatical emphasis on the topic of the report by making it the subject, but if the first person fits the situation more naturally, they should use "I" as the subject instead of twisting the prose artificially. Moreover, they should never refer to themselves in the third person, such as

"this writer thinks." Students should also be wary of the passive voice on revision, not during the initial draft. Although the passive voice makes prose sound limp, it is a natural feature of the English language. An occasional passive voice is preferable to a sentence tortured into activity.

Have students exchange rough drafts of a process report. Each person should examine the report for use of passive voice. If students have difficulty identifying passive voice, you might tell them to look for a form of the verb *to be* plus a past participle (*am, are, is, was, were, been* plus a word ending in *-en* or *-ed* overcomes the problem of teaching definition of past participle, etc.). If students begin this search with the last sentence, they will avoid the problem of being caught up in the narrative and will concentrate directly on individual sentence structure. Readers should underline each use of the passive voice.

When readers have finished underlining, they should return drafts to the writers. Have writers dictate some of the more difficult sentences and write them on the board. Then, change these sentences to active voice with the whole class. Discuss the original and altered sentence to determine which is more effective.

Whether reporting the functioning of a mechanism in the present tense or a series of actions in the past, the writer of a process report addresses an audience who wants to understand the theory or rationale behind the process. The purpose is to provide useful information efficiently, accurately, and effectively. To achieve this the technical writer often uses graphic aids. A simple diagram of an electrical circuit neatly labeled, for example, helps supplement a discussion of the operation of stereo speakers. Like the text they accompany, such graphics enable the reader to visualize an unfamiliar concept. When students adapt or copy diagrams for instruction manuals, they should simplify them according to the sophistication of their audience and the material covered in their text. A graphic aid should contain only the information relevant to the purpose of the report it illustrates. Unnecessary detail often confuses a reader as much as inadequate or inaccurate detail. Adapted material should, of course, be credited by appropriate footnotes.

PROPOSALS

The proposal is a specialized form of persuasive writing. Unlike the conventional persuasive paper, the proposal makes its case by factual presentation of the feasibility of a project. The proposal provides an excellent format for students to investigate problems close to their lives in school or in the community and to present a reasonable way of solving such problems. The audience of the proposal is the person or group that can authorize or provide support for action on the proposal, and the purpose of the proposal is to demonstrate that the proposed course of action is necessary and adequate.

Consequently, the introductory section in the proposal must describe the problem clearly and demonstrate how the proposed action will solve the problem. Next, the body of the proposal lists the materials and activities required, itemizes the cost of materials and activities, and establishes a schedule of work, including a date of completion. Finally, the conclusion summarizes the reasons for recommending adoption of the proposal based on the facts presented.

The grounds for approving a proposal are necessity and feasibility, not moral imperatives. Hence, a proposal to allow students to leave the school grounds at lunchtime must be based on a demonstration that the result would be more efficient use of the school cafeteria and a monetary saving for the school, rather than an argument that the constitution forbids involuntary servitude.

Collect a list of school and community problems that are amenable to solution by students. Discuss the kinds of information needed to define one of the problems, to discover the solution, to document the costs, to propose a timeline. Help students discover the complexities of solving seemingly simple problems. Have interested students select one problem for which they feel they can offer a legitimate solution. Discuss the potential audience of the proposal (e.g., principal, school board, PTA). Next, have students write a proposal making sure they include appropriate language and support. Finally, have them present the proposal to the audience.

The audience of a proposal is usually asked to spend money, to change conditions, or both. Sometimes the audience requests the proposal; for example, the owner of a lot invites a builder to submit a proposal for construction of a house, meeting the budget and space specifications of the owner. Just as often the audience does not solicit the proposal; for example, a group of parents proposes to the school board that school athletic facilities be opened for summer use. When the audience invites the proposal, the audience usually supplies the writer with a list of specifications that must be met. On the other hand, when the writer initiates the proposal, the specifications must be clarified by the writer. Students must be reminded that although the proposal is a solution to a problem, it offers a plan for specific, positive action. It is not a complaint.

Proposal writing provides excellent practice with completion of specific tasks. Once a problem has been identified, the group can delineate tasks involved in the completion of the proposal. These include items such as definition of the scope of the project; preliminary projections of the cost (including materials and labor required for construction, maintenance, etc.); impact of the proposal on the organization; estimated time for each stage of implementation of the proposal. Members of the group are then assigned specific information-gathering tasks: How much is the audience willing to spend? How much will materials cost when they are needed? Do enough people perceive a need for the proposal that the audience will be perceptive? Will the labor and other personnel required be available when proposed deadlines call for them? The group then meets to revise the proposal in light of the information gathered. Group pressure to produce this kind of information is often a new experience for students; but it is realistic, both developmentally, as they gain skills and confidence through their search for information, and professionally, as proposals for business or community often represent the work of a group of people.

While each member writes a part of the proposal, the leader of the group is usually responsible for putting the finished proposal together, writing an introduction, and revising manuscript style so that the report is internally consistent. All members should have a chance to read the final report and make changes agreed to by the group. Once completed, the report should be submitted over the signatures of all members of the group. The teacher should give deadlines for gathering information and a strict deadline for submission of the report so that the group has

a secure framework within which to function; however, the teacher should give the group as much control as possible over its day-to-day workings. The group will function better if the teacher exercises careful control over the initial subject of the proposal to make sure that it can be completed within the time allotted.

"Play through" with the class the process of preparing a proposal on a topic the teacher has planned. Assign names and duties to members of the fictional group and let the class contribute problems and solutions in the definition and information-gathering process. The "group" is writing a proposal for the senior class to sponsor a dance in a neighborhood parking lot after the first football game. How many permissions have to be obtained? To whom should the proposal be submitted? Should Willie Jackson speak to the owner of the lot before Eleanor Andrews speaks to the principal? Carlos Lopez is to make arrangements for music, but how much is his budget? Should he have a live band? If he uses records, will he have to pay permission fees to the record companies? Jake Stein is in charge of finding people in a nearby school who have organized similar programs who can offer advice. Can other members accomplish any work before Jake's report?

Experiences like this will acquaint students with the amount of time and effort that goes into a section of the report which may emerge as one or two sentences in the finished version. As an indirect result, students may begin to see the advantages of group rules, the importance of deadlines, and the disastrous possibilities of last-minute preparations. It is wise to make the proposal project an ongoing assignment during which the class works at other related tasks such as writing descriptions, definitions, and directions. These technical modes of communication are all necessary to complete a proposal, and the practical purpose (students' desire to have their proposals adopted) quickens attention to the rigors of writing the "three D's."

Of course the proposal should be submitted in a form that not only shows the efforts and skills of the writers, but also inspires the audience's confidence that the proposers are reliable. The finished proposal should be neatly typed, and visual aids

should be carefully labeled. The formal proposal is submitted under a *letter of transmittal* (see Appendix 2) which explains the occasion and authorization for the proposal.

RESEARCH REPORT

A report of research may range from a brief book report to an elaborate term paper with corresponding variation of format, according to the audience and purpose of the report. In academic situations where teachers are the most frequent audience for the research report, the purpose is to demonstrate verbal control over a body of information. One of the most difficult aspects of conducting and reporting research is that the discrete tasks involved are not always directly related to each other—each may have its unique demands. For example, the student is often learning how to summarize and take notes on a body of information that is itself unfamiliar. He/she must then assemble a coherent paper from these undigested bits of information and submit it with footnotes and bibliography whose conventions he/she is uncertain of. In spite of these difficulties, however, students must learn to carry out and report research for success in school. As discrete tasks are easily broken down for practice, learners will come to appreciate the demystification of this staple of American education. The teacher should continually realize, however, that the real purpose of a research report is the coherent presentation of a body of knowledge synthesized from a variety of sources. While supporting skills are important, they are subordinate to the final product.

We have devoted this separate section to the research report because of its importance in the curriculum. Obviously, a proposal, a process report, a lab report, and a memo are all based on "research" reported in special formats. Writing a research paper, however, is also specialized, requiring particular skills and approaches. The related activities that follow incorporate the major skills in writing a research report and can be adapted to other units in a writing class.

Have students write a class research paper to master the mechanics of research. Select a topic of general interest, and have the class brainstorm different aspects of the topic that they can research. Select one aspect and write a thesis statement with the class. Propose a preliminary outline and

invite students to make revisions. Next, discuss common reference works available to identify sources of titles for potentially useful books and articles. You might list the *Readers' Guide*, card catalog, abstracts, indices, microfilm, pamphlets, etc.

Give students 3 x 5 index cards, and assign groups the task of finding as many sources relevant to the thesis statement as possible. Provide a sample bibliography card to use as a model for recording the information. (See Appendix 2.) When groups return, discuss the information gleaned from various sources and difficulties encountered using the sources.

Have students compare their bibliography cards with each other, noting differences in information. Discuss different bibliographical entries for various sources. Instead of making students memorize conventions, just give the samples.

Have the class revise the preliminary outline to reflect the availability of information, and assign subsections of the outline to small groups. Each group will be responsible for gathering information about that subsection and ultimately incorporating it in the final research report.

The process of taking notes is one most often cut short by students. While different researchers may have different techniques for taking notes, their purpose is the same: to record information in such a way that it can be included in the report either as an acknowledged source or synthesized into a new idea. All researchers want to avoid plagiarism and give credit where it is due either as quoted or paraphrased material. This effort, however, begins with the recording of information from the source. One of the co-authors of this text records information as direct quotations, enabling him to know exactly what the source stated. He then summarizes and synthesizes during the writing stage. The other co-author summarizes at the note-taking stage. (See Appendix 2.) Whichever approach adopted by the researcher, at some point the information will be summarized. This process requires practice to ensure that the meaning of the source is not lost or altered in the transition.

Have each student prepare note cards (see Appendix 2) for at least one article relevant to the research topic. The student may either quote the source directly or summarize

the information on the card. If Jerry quotes directly, have him summarize the ideas on another card or paper. Then have students exchange summaries. The reader should tell the writer what the main idea is according to the summary. The writer should compare that idea with the source to be sure the summary has accurately reflected the source. This kind of activity should be repeated periodically to maintain a check on the recording of ideas.

Have the class discuss some of the ideas they are deriving from their research about the topic. Revise the outline according to the new information. Then, help students select areas of the outline which require further research and refinement.

At this point students have developed the skill to record the information necessary for writing the research report. This ability includes: locating sources of information, gathering and recording bibliographical data, taking notes from appropriate sources, summarizing and synthesizing ideas based on the information, refining the outline for writing. Students should also realize, however, that the research process is seldom so linear. Often the researcher has to locate and record more information after the writing has begun. The process usually moves back and forth from recording information to writing, to gathering more information, and returning to writing.

Have each group begin writing its subsection of the report from their note cards. Whenever a source is used directly, it should be acknowledged with a footnote. Discuss various methods of footnoting with the class, and select one for this report. Give each student sample footnotes for the different kinds of sources. They should use these samples as models when they write.

Once the subsection is written in draft form with appropriate footnotes, the group should select one student to rewrite it for final editing. All members of the group should help the writer whenever necessary. Once the subsection has been rewritten, all should take part in editing it, making sure the content and style are clear, the conventions of the footnotes and bibliography are correct, and the mechanics and punctuation are perfect.

Finally, the class should elect an editorial board consisting of one member from each group. This board takes all the subsections and puts them together into a coherent report. In addition to editing subsections, the board should also write an introduction and conclusion of the report.

Often an abstract of the research report is omitted in high school classes, but we believe its retention would serve several purposes. First, it would help prospective readers of the report by providing a quick overview of the contents of the report. Second, it would allow students to practice condensing information and putting it into their own words. Third, it would complete the research report.

Have members of the editorial board take the final report back to their respective groups. Each student should write an abstract of the report. Then, each group should select the abstract which best reflects the entire report and submit it to the editorial board. The editorial board then chooses the best of these group abstracts to serve as the abstract for the class research report.

STUDENT ACTIVITY
REPORT WRITING

Project: Public Opinion on Controversial Issue

Have the entire class or small groups consider issues current either in school or in the community. Discuss what others might think of the issues. For example, students might believe their education is irrelevant after graduation. At the end of this discussion they should write a statement of the problem they wish to explore.

Have the groups or class brainstorm potential audiences that might be interested in opinions on this particular issue. For the example given, students might cite: teachers' association, PTA, administrative council, school board, etc. After selecting an audience, they should begin listing its characteristics, such as what aspects of the issue would be of particular value to that audience.

Have students discuss sources of information about the issue. Discussion could include articles in professional or popular magazines, opinions of students, opinions of teachers and other educators, etc. Divide the responsibility for recording information from these sources.

Depending on responsibility, each group or student should list steps for recording information. For opinions, for example, students should consider background information of respondent, specific questions to be asked, how many people will be surveyed, how the sample will be selected, how the results will be analyzed, etc. (See Sample Report Format, Appendix 2.)

After each group or individual has recorded all the information, the entire group or class should explore ways of writing and presenting the report. In this discussion, students should consider audience, type of presentation, results, major points they want to make, graphics, etc. Then, individual students or groups should compile the report, writing drafts, sharing with sample audiences, revising and rewriting. The teacher should act as an audience during this process to check the final report prior to submission. Finally, students should present the report to the real audience, either as a presentation, a written report, or both.

CHAPTER 4
SCIENTIFIC WRITING

Although scientific writing is the most "objective" of the types of writing we have discussed, many subjective decisions affect the final product, both in terms of content as well as style. Even before considering the writing stage, the scientist decides the topic to be investigated, the procedure to be followed, the method to be employed in the analysis, and the factors which will be considered important enough to include in the conclusions as well as those which will be excluded. Although the scientist has strict guidelines to follow for each of these decisions, subjectivity enters as each guideline is based on assumptions which the scientist accepts as valid. Many of these assumptions may be open to question. (14) Consequently, both the reader and writer of scientific reports should realize that while the reports are objective in nature, they are not "truth."

In addition, throughout the experiment the style of the scientific report has a great bearing on the interpretation of the information. Throughout the writing the writer makes decisions about sequence of ideas, sentence structure, and choice of words. For effective, clear scientific writing, the writer should realize how each of these decisions might affect the reader's understanding and attitude. These considerations are as important in scientific writing, in spite of its objective stand, as they are in other kinds of technical writing.

TECHNIQUE

Much of what we have said about report writing applies as well to scientific writing. As with other forms of technical writing, the purpose of scientific writing is to convey precise, correct information in the most efficient form to either a specialized or a general audience.

RECORDING THE EXPERIENCE

The report of an experiment is a direct record of an experience and often follows the scientific method itself, especially if the

format is a formal presentation of the experience. In the scientific method the researcher follows five general steps. First, the researcher identifies a problem to be solved, focusing ultimately on specific goals or objectives. This usually requires examination of a general array of ideas and narrowing the field to the number of ideas that can be examined within the scope of the researcher's particular situation.

Second, the researcher forms a specific hypothesis about the problem. This step further clarifies the problem by suggesting possible solutions which will be tested through observations. This step is more involved than it appears as written. Actually, the initial hypothesis is often explored through reason or a small experiment and then modified for extensive examination.

Third, the researcher observes the hypothesis in action through a series of carefully determined stages. Having previously determined which factors will be taken into account during the experiment, the researcher records all data affecting the hypothesis.

Fourth, the researcher analyzes the results of the application of the hypothesis. This analysis may be a description of what was observed during the experiment, or it may be a statistical procedure to test the success of the hypothesis. In the former, the results are explained through detailed description. In the latter, the attempt is to determine the probability of the outcome of the experiment being attributable to chance or to the proposed solution (hypothesis).

Fifth, the researcher draws conclusions about the validity of the hypothesis on the basis of the observation and subsequent analysis. For the conclusions to have meaning for an audience, they should be fully supported by the results of the experiment. Scientific writers sometimes go beyond the actual results and state some conclusions that are only implied but not actually proven by the experiment. These statements could be included in the report, not as conclusions, but only as implications or areas for future investigation.

For most scientific writing, this approach provides a valuable method of recording information, since it proceeds naturally through the experiment. During each stage lines of reasoning and observations should be recorded for inclusion in the final report. This information, however, has little meaning until given form and context in the report. The "meaning" is synthesized in statements of the objective, procedure, analysis, and conclusion. The recorded information, then, includes ideas and statements in all areas, including the data. The teacher should help

the student with each of the areas by providing examples, techniques for arriving at end products, and helpful feedback about their efforts.

Select a general area of interest, such as the existence of UFOs, and discuss it with the class. Try to encourage students to state their opinions with some supporting evidence or examples. Once they have shared their general opinions, ask how they might actually prove or disprove the existence of UFOs. After they have given a few ideas, ask them to state exactly what they are trying to prove or disprove. (It is often easier to state the question or hypothesis after exploring some tentative procedures.) Write the statements on the board. Finally, ask the class to select the most clearly stated problem or question and restate it as a hypothesis. Exercises of this kind help students realize that researchers do not begin with a clearly stated hypothesis but rather with a general area of interest and then narrow the ideas to a single hypothesis.

The actual recording of observations during an experiment also presents problems for many students. In the initial stages of experimentation, learners should use data sheets provided by the teacher so that they will be sure to include important observations in a legible, sequential fashion. While notes for other technical papers can usually be rearranged or even reacquired, notes or data for the experimental report are usually used as recorded and cannot be obtained after completion of the experiment.

We have concentrated on recording the laboratory experience for a specialized audience, because the experience and its record are unique. Recording the experience for the general audience requires the same precision and accuracy as the laboratory report, but the writer selects a few parts to convey the whole accurately. If the student wants to explain why a piano has a tempered scale, the explanation may focus on the movement of a single plucked string which produces a harmonic series. The general audience does not need to know how to operate an oscilloscope or how to derive frequencies for each note mathematically. Students must know their topics well enough that their composing energies go into selecting the right words and examples for the intended audience.

Using a report of an experiment conducted by the class previously, have each student list important details which would be of concern to a general audience. Then have students compare their lists with each other, discussing reasons for inclusion or exclusion of specific details. Finally, as a class make a list of the vital details for the general audience.

AUDIENCE

The writer of a scientific report may have either of two audiences: a specialized one or a general one. This distinction is important as each audience demands a different method of recording information, different purpose, and different format. While the student usually writes for only a specialized audience in school, much scientific writing is actually for a general audience.

General Audience. Scientists and laypeople alike deplore the general failure of the educated public to recognize or understand the processes, potential, or failures of science in an age often controlled by scientific discovery and implementation. Journalists, for example, with little knowledge of science often have the responsibility for translating the significance of a scientific discovery or insight for the general public. The heart of the problem is translating sound science into language comprehensible to a general audience.

Effective writing about science conveys to the reader not only the scientific subject but also its significance. Readers of Rachel Carson's *Silent Spring* were moved to political action by the clear exposition of the scientist-writer. Few readers of her earlier work, *The Sea Around Us*, fail to sense the teeming microscopic life of the oceans. Scientific writing for the popular audience is perhaps the most difficult task, because the writer has to command the content and vocabulary of the specialized field well enough to simplify or transform it without distortion.

The problems for the writer are twofold: selection and translation. First, the writer must select all the significant details of the scientific concept without providing those which will distort the idea or distract the reader. Second, the writer must translate the idea, usually couched in scientific terms, into language and style appropriate for the general audience.

From the list of vital details derived during the previous activity, have students write one paragraph describing the results. If technical terms were used in the original report, list some of them on the board, and ask students for other ways of explaining the procedure without using those terms. Then have students share their paragraphs with each other, comparing the general meanings of the works. If the meanings differ, discuss which meanings are distortions and which accurately reflect the original report.

Finally, have students reread each other's paragraphs. This time they should read for interest. During this sharing, they are reading the material as they would an essay in English class, looking at style and language and the total effect on the general audience.

The unique situation of scientific writing for a general audience creates special obligations for the writer. The general audience of a popular article on a scientific subject lacks verifying data; furthermore, the reader usually does not have the knowledge or skill to verify the data or conclusions. Moreover, the reader's own experience and observations will not assist in evaluating the accuracy of the writer's statements. The scientific writer therefore has a moral responsibility for stating limitations and biases that other writers may overlook.

Herman Estrin has his engineering students at New Jersey Institute of Technology create children's books as a part of his technical writing course. (8) Such an exercise might be usefully adapted to a high school class by having high school students write scientific articles for grade school students. These articles could be edited by the class, shared with some grade school students, revised accordingly, and, finally, composed into booklets for the grade school.

Specialized Audience. The important difference between the general and the specialized audience is that the writer often knows more about the subject than the general audience and less than

the specialized. Yet the specialized audience's need to know is real, because the laboratory report or essay is the chief indication of what the student has accomplished. Unfortunately, few students receive instruction in the writing of the scientific report for this audience. While teachers of English may be able to provide some help with style and language, they do not have the content background to provide meaningful assistance in organization and accuracy. Conversely, science teachers have the content, but seldom feel qualified to help with style, other than gross mechanical errors. The result is that many students never receive instruction in writing a scientific report for a specialized audience.

As students begin to write their reports or essays, they should consider the audience in scientific writing as seriously as they would consider audiences in other kinds of writing. The specialized audience may have the knowledge but still needs accurate communication of the specific concept or procedure from the student. Because the audience is well versed in science, understanding of key terms may be assumed. However, the learner should not use scientific jargon just to impress the audience, as it usually impedes the effectiveness of the communication. If a term is essential or if it facilitates the flow of the writing, it should be used. If not, the writer should find another way to explain the concept or procedure. Students should realize that the main objective of all writing is to communicate effectively and efficiently with an audience. Usually, the more direct and simple a composition, the more effective it is.

William Gilman provides several lists of hints and words to help the scientific writer. In one of the lists he cites "Big Words" and "Substitutes." Some of these are:

Big Word	Substitute
accelerate	speed up, go faster
aggregate	total, sum
ambient	surrounding
unavailability	lack (9)

Students should be aware of language and appropriate substitutions for both audiences. They should also realize, however, that some words (such as "accelerate") offer specialized meanings which have specific denotations for the specialized audience not always understood by the general populace. Students must know

which words are important to the concept and exactly what they convey to the reader. For example, while some individuals do not distinguish between velocity and acceleration, for the specialist the distinction is very important.

Make a list of words covered in the course which have important specialized denotations. Have students discuss the specialist's understanding of the words and the general reader's understanding. During this discussion they should consider differences in understanding and inferences that respective readers might draw from seeing the words in different contexts.

PURPOSE

The purpose of scientific writing is tied closely to the audience and has been implied in the separate discussions of general and specialized audiences. For the general audience the purpose of scientific writing is to make accessible concepts and theories often hidden by scientific jargon and technique. A vital part of that purpose is capturing the essence of the concept without distortion through overemphasis or omission. In striving to achieve the goal of communicating an idea and conclusion to a general audience, scientific writers must be aware of these potential pitfalls. In addition, the scientific writer must resist the temptation to display superiority over the reader. Although the writer usually does possess more knowledge in the particular area than the general reader, the communication will not be accepted by the reader if the tone is offensive. The objective of clear, effective communication must take precedence over self-adulation.

The writer's purpose in writing for the specialized audience is to demonstrate the writer's knowledge and accomplishment to readers who are versed in the field. In this effort the writer must be continually aware of the specialized meanings vocabulary will hold for this audience. When attempting to impress the specialized audience, the writer may sometimes use a stilted, pedantic style. This usually creates more confusion than understanding. To demonstrate knowledge or a procedure, the writer should strive to be straightforward and clear, rather than circuitous and ambiguous.

FORMAT

The scientific article for a general audience is an essay with the components of any other essay. It may describe a process, define a term, narrate a procedure, explain the relationship between a cause and effect, or convince an audience of the consequences of a particular action. As with other essays, the writer has to entice the reader before expounding on the thesis. Dramatic illustrations or anecdotes often provide the necessary incentives for readers. The essay should also give the reader a sense of the whole subject before delving into specific details. Then the writer should proceed through the essay in a logical manner, developing the argument so that the reader can envision the procedure or is led to the desired conclusions. The final paragraph or statement should show the significance of the subject in the larger context of the scientific field and in the context in which the reader is involved.

Select a well-written popular science article, such as one from *The Smithsonian* or World Book Encyclopedia's *Science Year*, and discuss it with the class. Instead of concentrating on the content, examine the style, discussing each section of the article in terms of what the writer is doing.

For the specialized audience scientific writing may take either of the two forms: essay or laboratory report. In the first form, the writer should follow the format applicable to other essays but with special emphasis on sequence and choice of words. The reader has much of the background provided in the essay for the general audience; the writer can therefore omit this information unless it has direct bearing on the concept under consideration. Rather, greater care should be taken with the development of the thesis so that the audience realizes the extent of the writer's knowledge and preparation. The writer should also select words carefully to convey the particular concept.

The laboratory report has a highly structured format which varies somewhat from teacher to teacher. We will discuss the specific components later. In general, a laboratory report contains a description of the phenomenon to be explained, tentative explanation (hypothesis), description of the actual test experiences, and conclusion accepting or rejecting the hypothesis.

TYPES OF SCIENTIFIC WRITING

Scientific writing takes several forms, including those which we have discussed previously. We will therefore devote this section to two distinct types of scientific writing: the popular article and the laboratory report.

POPULAR ARTICLE

Two factors play an important role in writing a popular article: audience and knowledge. Since the translation process is a crucial aspect of the popular article, students must have a well-developed notion of the general audience for whom they write. For some, advanced students, peers or even the general public may form the audience. For others, elementary school students are a potential audience. A second important factor is knowledge of the subject. The subject should be one that the student has studied formally or has had some experience with as an avocation or both.

Have students write down one or two topics they have studied and know well and a group of people who do not know very much about those topics. The people may include younger students, peers, parents, or the general public.

Students may take some prodding to discover topics with which they feel competent. One suggestion usually produces another. The teacher may also have to use some ingenuity to identify real audiences. (See Appendix 4.) Would the school paper carry an article on a scientific topic? Could the sixth grade class use an illustrated story explaining what light is?

Once students have selected topic and audience, have them consider the audience to determine its characteristics. For a grade school audience the discussion may include the teacher of the younger students to discover the vocabulary level of the children, a survey of their reading and science texts, etc. For an audience of parents the discussion might

involve several members of that group. After students have completed their informal discussions, they should write a one-page analysis of the characteristics of the audience and the adaptations to be made in the article to accommodate that particular group.

Since all students are working on unique projects, the problem for the teacher is to keep the class cohesive. In most cases interest in their projects will keep students motivated, but classroom momentum is also important. One useful way to keep the class together is to arrange for progress reports to be handed in and delivered orally. The report should describe briefly what the student proposes to do and what the student has accomplished thus far. The oral report can be followed by a discussion of relevant ideas for the article.

Have students write rough drafts. The topic and audience should be written at the top of the page. Divide the class into groups of three and have each student read and make written comments on the other papers. Student readers are friendly editors who should give more than casual attention to the appropriateness of the style to the intended audience. Encourage students to have members of their interested audience read the article before they actually write the final draft. Then they can include their comments in the final revision.

Since the purpose of the popular article is to inform, entertain, and, possibly, persuade the audience, the format must be appealing to the eye. Students should have the manuscript typed, if possible, and include appropriate graphic aids. If the article is directed to children, the writer should examine some children's magazines, such as *Ranger Rick*, and *National Geographic World*, to see the proportion of illustrations to text and the kinds of graphics used. Since the audience is a "real" one, the final preparation will require a considerable amount of time and effort.

Have students arrange to present their finished products to the audience and to someone with expertise in the topic. Students should report the responses of both to the class.

The format of the popular article depends on the audience and purpose. It must be readable both in style and in arrangement on the page. Even more importantly, it must be accurate in its presentation of information.

LABORATORY REPORT

Most laboratory experiments performed by students in high school and the first two years of college leave little room for innovation. The requisite virtue for this type of scientific writing is accuracy. The hypothesis and procedure for testing are usually implied or stated in the laboratory manual. The teacher often establishes a format for recording and explaining the data. For many students the most difficult habit to acquire is recording the data so that they can interpret it accurately from the beginning. Since both student and teacher use the recorded data, it must be legible and coherently arranged either to write or to evaluate the report. (See Appendix 3.)

The laboratory report used in schools often contains sections to facilitate conducting an experiment. The report begins with a statement, usually of no more than one sentence, which specifies the purpose or objective of the experiment. The statement is frequently phrased as a question which the student then answers in the conclusion. While beginning science students can often derive the statement from the title and discussion of the experiment in the laboratory manual, the purpose of the learner's experiment is not always the same as the discussion in the manuals. In these instances the student should read through the procedure to arrive at a statement of purpose.

The procedure contains two sections: a description of the materials and apparatus to be used and the steps to be followed in conducting the experiment. With the procedure clearly in mind, students collect data from the experiment. They should prepare a data sheet before the experiment by planning the kind of space the data will occupy. Often such a sheet is provided in the manual or report form. Random jottings are difficult for the student to recover for later analysis and for the teacher to evaluate as part

of the final report. Neatness and organization in recording the data encourage precision in measuring it.

Discussion of the results, including discrepancies between experimental results and theoretical expectations, is an important way for the student to show understanding of the principles being studied. While significant differences between experimental results and theoretical predictions may point to student error, the whole thrust of experimental science is to account for systematic differences between theoretical predictions and experimental results. This accounting is part of the excitement of the laboratory. In the discussion of the theory and results of the experiment the student demonstrates intellectual maturity and understanding of the framework of science.

Students should remember that they are writing a report, not an instruction manual. Discussion should be a third person description, not a series of commands ("The material melted at 348°C" not "Heat the material to 348°C"). Although the student is writing a description of the experiment, it is not part of a narration. The description should focus on what has happened, not on a series of discrete actions performed by the student. The distinction is important because the learner needs to understand the writer's role is that of an objective observer and recorder of evidence, not that of a participant or character in a story.

The calculations and conclusion sections summarize the observations of the experiment and relate the results directly to the hypothesis. The calculations section contains the computations based on the operations described in the procedure section. Data used in calculations should be presented in tables suitably labeled and arranged. Sometimes a written description of the method of computation is desirable; other times sample calculations are sufficient. The conclusion is a summary of what happened in the experiment and of the results. Disagreement between experimental results and theoretical data should also be discussed, if relevant. Finally, the student should answer or clarify the question or hypothesis presented at the beginning of the experiment.

Using an example of a good laboratory report, discuss the different sections of the report. During the discussion focus on specific elements and ways of expressing the ideas. Then have students develop a checklist for evaluating their own reports. Such a checklist will be more meaningful coming from students rather than from the teacher.

STUDENT ACTIVITY
SCIENTIFIC WRITING

Project: Mental Telepathy

Discuss as a group the idea of mental telepathy. Encourage students to seek examples of its validity. Have them find articles about procedures used by entertainers to stimulate mental telepathy, accounts of personal experiences with the phenomenon, and scientific experiments investigating mental telepathy. Assemble a bibliography, preferably annotated on note cards. Make the bibliography available to students at some centrally located place. After they have explored the literature, have students form a hypothesis about mental telepathy and design an experiment to test the hypothesis.

The following is an approach used by one class. Having read the literature, the students decided to test the existence of mental telepathy in the class by measuring the success of identifying playing cards through this means. As a class they developed a definition of the problem based on the reading and personal experiences of the group and formulated some questions based on the definition. Do some people have ESP? Do some have the ability to send messages without the ability to receive them? Do some have the ability to receive but not to send messages? Ultimately, the class settled on a single question: Can a pair of individuals transmit and receive information via mental telepathy?

The students then outlined the procedure for the test. During this stage they considered several other questions. Are playing cards useful instruments? Too confusing? Should the test be made with numbers? pictures? designs? Should the test subject respond aloud or in writing? Should the sender transmit an image of the number or the name of the number? How many tries will constitute a reasonable sample? How many people should participate?

They decided to use a full deck of playing cards with several pairs of students attempting to transmit and receive the information on the card. Within the pairs each student attempted to

transmit and receive. For each pair a third student acted as observer, counting the number of successful transmissions of the information. With all the data recorded, they compared the actual results with those that could be expected by chance. Once they completed the calculations, the students formed their conclusions, referring to the original question and some of the literature they had read. Finally, they discussed how the experiment might have been modified or replicated.

As an extension of this exercise, some students could have written a brief popular article for the school or local newspaper, explaining the results to a general audience. The article would focus on the conclusions reached by the group, the problems involved in testing for ESP, and similar tests reported in the literature. The finished papers could be circulated among the class so that the entire group could select several to submit to appropriate channels for the general audience.

CHAPTER 5
IMPLEMENTATION

As a conclusion to this text on teaching technical and scientific writing, we have included some statements concerning general implementation of our ideas in secondary school classrooms. Our concluding thoughts are divided into two areas: evaluation and interdisciplinary approaches.

EVALUATION

One of the major realities of our academic system is evaluation. Although we believe it may be broken into several subcategories—evaluation of the program, feedback to the student about the quality of work, and assessment of the student for someone else—many teachers consider only grading when they discuss evaluation. We have separated these three components of evaluation because each requires a different approach, has a different audience, and takes different forms.

PROGRAM EVALUATION

The primary purpose of program evaluation is to determine how successfully a particular program has achieved its goals. This necessitates examination of several factors, including goals and objectives, audience, and materials. Before we can evaluate a program, we should first delineate the goals and objectives. What do we hope students will gain from this particular program? For technical and scientific writing we might list objectives such as the ability to write—

- An effective resumé for a particular position.
- An effective business letter for a specific purpose and audience.
- An effective report on a particular subject for a specific audience.
- A scientific report for a specific audience.
- On a scientific subject in terms understandable to a general audience.

Each of these objectives might also be clarified in terms of what the evaluators believe constitutes "effective" in each type of writing. In addition to the writing itself, the evaluators may want to consider indirect but equally important effects of the program. These might include student attitudes toward technical and scientific writing and toward their own backgrounds and futures as well as their confidence in interacting with the various audiences of technical and scientific writing. Finally, evaluators should consider teachers' subjective evaluations of the program. Often the most important aspects of a program are not readily measurable by objective procedures. Areas such as student enthusiasm, ease of instruction, and general importance of tasks are sometimes overlooked when programs are evaluated because they are not easily tested.

The second and third areas of consideration, audience and materials, are easier to describe than the goals and objectives of a particular program. One of the first questions evaluators should ask is "Who will read this evaluation?" Is the report for a school board, principal, other teachers, or only for the particular classroom teacher? While goals and objectives may not be affected by the audience, the form of the report and the method of evaluation might differ according to type of audience. For example, if the report were for the entire system and school board, evaluators would probably be able to request outside readers, construct elaborate questionnaires, and make extensive use of statistical analysis. If, on the other hand, the teacher is the only audience, outside readers probably could not be hired, elaborate questionnaires may not be developed, and the ability and time to conduct and interpret statistical analysis may be missing.

The audience will also affect the final form of the report. For a school board audience it might be a formal presentation with graphics and outlines, while brief notes might suffice for the solitary teacher audience. In short, the audience will help determine the parameters of both the form of the report as well as the method of recording the information.

Program evaluators should also consider the materials and resources used. Of initial interest are those used by students. Sometimes teachers assume learners benefit from a particular text, although the latter may actually find the opposite is true. The faulty assumption usually comes from failure to obtain direct input about the materials from students. During an evaluation of a program, students should have an opportunity to state their views on materials and resources.

Also of interest are the materials and resources used by the teacher. Although students may not have had direct contact with these, they may have been influenced indirectly through the teacher's ideas and methods. Consequently, all resources, including materials consulted by either teacher or students, should be examined during a program evaluation.

To evaluate a specific program, you might take the following steps:

1. List your goals and objectives and the criteria you would use to evaluate achievement of the objectives. For example, for "Write an effective resumé" you might list:
   - Contains no mechanical errors.
   - Is visually appropriate.
   - Highlights items pertinent to position desired.
   - Includes necessary general background information.
2. Select a random sample of resumés from your students, perhaps selecting names from a hat until you have the number you want. Select a random sample of resumés from another class which had not participated in the program.
3. Code all names and classes.
4. Ask two other teachers to read the coded resumés (perhaps a total of 50, 25 per class).
5. Train the readers in the criteria you have established for effective resumés. Use some sample resumés separate from those selected for the evaluation to help clarify the criteria.
6. Ask the readers to rate the resumés as *poor* (*1*), *fair* (*2*), *good* (*3*), or *excellent* (*4*), according to the criteria.
7. You can then analyze the results statistically (e.g., using an independent t-test) or just compare ratings in each category and determine where those in the program fall.
8. Select a random sample of students in the program and interview them. During the interviews delve into their attitudes and feelings about the major components and goals of the unit as well as about materials and activities. This purpose

could also be accomplished by a questionnaire, but the interview provides more opportunity to pursue ideas.

9. List the major experiences included in the unit, leaving space between each for comment. Have students rate each experience and comment on its helpfulness, both in the context of the unit and relevance for their own lives.
10. List resources you used to help you during the unit. Comment on and note each as a contribution to the unit. This may seem nonproductive, but it will help you in the future and may possibly help other teachers immediately.

FEEDBACK

Too often teachers confuse giving feedback to students with grading their work. Feedback entails reacting to the content and style of the work in a meaningful, helpful way so that the writer will be able to improve the effectiveness of the communication. Grading the work does not accomplish this end. At best, grading may affect the improvement indirectly by motivating the student to try harder next time. Grading usually indicates the completion of the task and is viewed separately from the task itself. Feedback, however, should be incorporated within the structure of the task so that the student will have an opportunity to apply the information immediately. If the opportunity for immediate application is not provided, much of the information will be dismissed and forgotten.

Reaction to written work may come from several sources. The teacher should not be the sole reactor for the student. In the instructional composing process suggested in this text, we have incorporated opportunities for student reaction to other students' works. Although this procedure is sound, the teacher has to plan carefully to prepare students for an unaccustomed role. Before students can become meaningful reactors, they need instruction and practice in reacting to others' papers. Teachers know how difficult it is to provide honest, helpful reactions to student papers. It is even more difficult for students to perform this task for their peers. We suggest that teachers lead them into the task gradually, beginning with nonthreatening experiences and culminating in full discussion about individual works.

In early sharing experiences have students work in pairs, such as Tim and Charlotte. During the first unit have Tim read his composition to Charlotte without any comment from her. As he reads, Tim should correct any error or confusing areas he spots himself. Then reverse the procedure with Charlotte reading her work to Tim, again without comment from the listener.

During a later unit, have Tim read Charlotte's work to her, stopping when he is confused and asking her for clarification. As Charlotte clarifies what she meant, she should make notes for later revision. After Tim finishes reading Charlotte's work to her, Charlotte reads Tim's work to him, following the same procedure.

Later, the pairs can go over each other's works in detail; but this procedure should not be rushed, as the initial tendency will be to approve everything without honest reaction or revision. At this point, students will need specific guidelines, such as looking for modifying words, errors in end marks and capitals, etc.

In addition to helping students work together, the teacher should also provide continual practice in reacting to written work. Such exercises help students realize what is important in a specific type of writing and also help with feedback sessions.

Write a mediocre composition of the same type which students are writing. Make copies for everyone as well as an overhead transparency. Have each student read and grade the sample composition. Then ask the class for the grades assigned. Usually, there is a wide variation in grades. This leads to a discussion of the criteria used by each student in determining the grade. As students state the criteria, list them on the board, discussing what each means. Finally, construct a checklist of criteria for that type of writing. This checklist may be used during feedback sessions.

After the checklist is formed, perhaps on another day, discuss the kinds of comments which students and teachers could make about the work which would be helpful to the writer without being overly critical. An open discussion of the types of comments and the tone of voice could help considerably in encouraging students to provide real help to each other instead of only blanket approval.

The leader also has the responsibility for providing feedback. Students can help each other very productively, but often individuals need the kind of assistance only the teacher can provide. This assistance, of course, varies. In some instances, it may be advanced constructive criticism for the better writers. In other cases, it may be patient advice for the poorer writers. Sometimes it must be stern interaction with uncooperative individuals. Responsibility for this feedback is the teacher's since students have neither the qualifications nor the authority to provide it. We suggest that the teacher try to conduct these feedback sessions with individuals or small groups of students during the composing process rather than after the work has been completed.

While students are working in pairs, ask Fred, Jim, and Mary, who all seem reluctant to interact with others, to meet with you to discuss their compositions. Provide specific suggestions, but limit the number to just a few that can be implemented immediately. During the next session, ask Juan, Jane, Richard, and Mabel to meet with you to discuss advanced techniques for their works.

Ideally, the final source for feedback is the real audience of the work. Writers should be encouraged to share responses to their letters, reactions to presentations, and comments on reports with the rest of the class. If they received the position for which they applied, their audience has provided a positive reaction. If their presentation/report was criticized by the audience, the criticism should be reviewed so that others can benefit from the experience as well. Since the ultimate purpose of technical and scientific writing involves communicating with a real audience, the reaction of that audience should be valued highly, not taken for granted in passing.

For a course or unit in technical writing, it is especially important to distinguish between feedback and grading. Since the student is learning to write clear, unambiguous prose in highly structured formats, feedback is important as the student gains control over the skills. The writer needs many opportunities to revise the work before final submission. Once the work is submitted, the student loses all further chance to change it. Feedback

from the audience is important here and is analogous to the goal. It would be useful to tie grades for work to audience reaction when feasible. The teacher might consider reinterpreting grades in terms of probable audience reaction. For example, resumés might be "graded" on three categories: "Do not interview," "Call later if first choice is unavailable," and "First choice."

To the extent that the teacher can be a master-editor and adviser, the student can make the best use of the teacher's skills and experience. The teacher must also give the student the realistic experience of judgment and actual performance. Thus, the teacher should lead the student to understand that the grade is a symbolic measure of the particular work submitted, not an assessment of the worth of the person who submitted it. Happily, the units in a technical writing course are sufficiently self-contained that a student who does poorly at one task is likely to do well enough on the next one.

GRADING

While the only audience of feedback is the writer, the audience of grading is varied, including the student, parents, administrators, other teachers, prospective employers, and future academic personnel. Teachers should realize the general impact of a grade on the student, both currently and in the future, as viewed by various audiences. The grade sometimes determines future avenues which a student may or may not pursue.

Many believe grading provides objective information about a student's performance. However, this belief contains two fallacies. First, the grade is usually more subjective than objective, since it reflects a teacher's subjective interpretation of student work; and, second, many factors other than performance often enter into the grading procedure.

Subjective decisions affect any grading process on several levels. First, the teacher decides which ideas reflect a student's total knowledge of a particular area. While these ideas may serve the purpose for some students, other students may have developed expertise in the same area but with different surface knowledge. For example, Herb may be able to solve a mathematical problem following a different route from that taught in class. If the teacher assesses knowledge primarily on the basis of the use of the technique taught in class, Herb may fail the test, erroneously indicating lack of knowledge.

Second, the teacher translates the ideas into assessment procedures, such as tests and papers. Some teachers, however, con-

sider papers too subjective, so they construct "objective" tests with multiple-choice or short-answer questions. Even here, personal judgment plays a major role. For example, the choice of words in a test may confuse a student, or the "incorrect" answers may actually be "correct" under circumstances not foreseen by the teacher but imagined by a perceptive student. While Bill may understand the concept, he may not be able to interpret the question or may see actual application of the "incorrect" answers, thereby failing the test but possessing the knowledge.

Third, the teacher decides the importance of each component of the assessment procedure in relation to the other components. Is completion of all the homework as important as a high score on the comprehensive examination or class participation? Even in a single test this decision could make a difference. Is knowledge of the parts of a plant as important as being able to describe cross-pollination in detail? With these and many other subjective choices, few can argue that a grade is an "objective," impersonal measure of knowledge or ability. (1, 12, 13)

Moreover, the final grade a student receives in a class usually reflects factors apart from knowledge in that area. While most audiences of that grade will interpret it as only an indication of ability and knowledge in that area, the teacher may often have allowed behaviors such as neatness, punctuality, language, and looks to have an effect on the final assessment, either consciously or subconsciously. Several authorities have indicated that students who agree with the teacher and cause fewer problems in class usually receive higher grades than those who do not, even when the latter actually possess superior ability. (17) Even when trying not to consider mechanics and neatness, teachers consistently rate mechanically correct compositions higher than compositions of the same content and style but with more mechanical errors. (10) Certainly neatness and mechanical correctness are important, especially in technical and scientific writing, but these elements should be expected, not graded. As a prospective employer or business acquaintance would not expect substandard work, the teacher should not accept work that does not meet minimal standards of neatness, mechanical correctness, and general literacy. These qualities are to be expected before assessment.

With all these problems with grading, teachers are still faced with the responsibility of assessing the student's knowledge and abilities in a specific area. In meeting this responsibility, teachers should acknowledge the limitations of grading and focus directly

on determining the factors that actually should enter into their own grading procedure. Once they have specified the important factors, they should examine the instruments and procedures to be sure they accurately assess the particular factors.

During a recent study Tuttle devised the following procedure to assess student performance in composition in three areas: improvement, effort, and quality. (16, 18)

To assess a student's growth in writing a narration, he compared performance on a pre-test with that on a post-test using the same stimulus and writing conditions. To be sure he was assessing the individual student's growth and not just relative class standing at two different times, Tuttle read the pre- and post-tests for each student at the same time. A rating was given for the amount of improvement.

To assess a student's effort, Tuttle kept a writing folder for each student. The folder included all drills, all rough and final drafts of compositions, and all extra work. Since he did not accept work from a student until it was satisfactory, the work in the folder was not graded. To arrive at a rating for effort, he simply determined the amount of work the student actually completed by counting the papers in the folder.

To assess quality of writing for an individual student, he asked each student to select the best composition and rework it. Since none of the compositions had been graded, the major influences on the student's selections were interest in the topic and self-evaluation of content and style. These compositions were read as a group, using previously established criteria as a basis for assigning a rating.

The final grade was determined by averaging the three ratings for each student: improvement, effort, and quality. These averages, however, did not always stand as final grades, as Tuttle sometimes placed greater emphasis on one area than the others, depending on the particular student. For example, in some cases the better writers showed little improvement since their pre-test compositions were already very high. Rather than penalize them for their abilities, Tuttle counted quality and effort more than improvement. Since all the underlying decisions about grading were subjective, he felt he should not automatically disregard his professional feelings about a grade in the final stage.

In short, he examined his goals and activities and carefully described the areas which he felt the final grade in that composition course should reflect. Once these areas were delineated,

he explored various methods of assessing abilities and performance in each. He discarded many of the traditional approaches, such as averaging grades on individual papers written throughout the semester, because these approaches did not truly reflect ability or performance in the specific area. Throughout his assessment, Tuttle acknowledged the subjectivity of the process and tried to make it fair to the individual student yet a valid and professional indication of actual ability and performance.

Meet with other teachers to determine exactly what the major goals of the course are. Then explore ways of assessing student achievement of these goals. Keep in mind that subjective judgments will enter into the procedure in all approaches, so an "objective" approach will actually not be any more objective than a "subjective" one. Use the approach or instrument that most accurately reflects a student's ability or performance in the particular area.

After selecting an approach, examine each component again to be sure it will measure what you want to assess and not something else. Then examine the rating of the student's performance through the approach. What factors will influence the rater's decisions? Finally, reconsider the final grade in light of what you know about the student's ability and performance.

INTERDISCIPLINARY

Much of a student's experience in school is fragmentary, broken into eight or more fifty-minute segments. Few students find much relationship among these fragments, including the various disciplines they are required to study. While we assume transference of skills from one subject area to another, teachers seldom provide direct aid in making these transitions. Consequently, only the brighter students consciously utilize concepts learned in one subject in other areas. Indeed, in most schools both teachers and students find more barriers than bridges to interaction among disciplines. When we can find appropriate bridges to connect disciplines, however, we should use them for they may help students transfer at other times as well. One of these bridges may be projects involving technical and scientific writing which often involve concepts and skills in several areas.

Some attempts to provide interdisciplinary experiences result in the creation of spurious connections among the various content areas. In such programs teachers from different disciplines try to teach everything together, forcing interaction at all times. Usually the result is that teachers vie for time to teach their respective areas. Often the teacher of English, for example, corrects the compositions while the teacher of social studies covers the content. The content of English is bypassed. This is not effective interdisciplinary instruction. Instead, it is forcing the issue through logistics rather than encouraging interaction naturally through appropriate activities. We suggest, therefore, that attempts at interaction across disciplines occur only when appropriate to the activity in which students are engaged. If, for example, a project requires both mathematical and writing skills, teachers of mathematics and teachers of English should work together to provide students with valuable insights into their respective areas of expertise.

The key to successful interaction lies in effective communication and planning across all the disciplines involved, as well as respect for each teacher and discipline concerned. If these factors are absent, the student will probably benefit more by separated, isolated instruction because some important concepts and skills will be overlooked. Even when communication and respect exist, the interaction should occur naturally, when the need arises. This need, for example, may be created by assigning students projects which will require knowledge in several areas and a synthesizing of that knowledge. In the preparation of a technical or scientific report, for example, students will usually have to use skills and information from several disciplines.

In preparation for interdisciplinary cooperation, teachers from all areas concerned should meet and explore the various ramifications and responsibilities of the project task. What general topics from the various disciplines will be of interest to all students? How should this information be disseminated? Who should be responsible for dissemination? What skills will students need to complete their projects? Who should be responsible for instruction in those skills? If time is added to work in some disciplines and subtracted from others, what about the skills and knowledges in those other disciplines? Will students be able to acquire the missed instruction later or independently? These and many other considerations should be confronted before a commitment is made to work across disciplines in a formal manner.

The formal approach, however, requires some administrative as well as pedagogical considerations. First, the teachers involved

need mutually free time in which to plan interactive projects and assign responsibilities. This time should be built into the schedule as part of teachers' daily routines. Second, someone must have overall responsibility for each project. If the final responsibility remains indefinite, coordination of effort may falter as each teacher becomes involved in a particular aspect of the instruction while no one oversees the total process. Third, each teacher should have a strong knowledge of the goals and subordinate skills in a particular discipline. If not, that discipline may be usurped by other teachers as they stress their own areas of expertise. Finally, all the teachers must constantly strive to ensure natural interaction among content areas rather than compel involvement to satisfy logistical considerations. Not all areas require equal input to every project just because the teachers are planning and working together.

An alternative to a formal approach to interdisciplinary cooperation would be to conduct a project in one class and ask other teachers to act as consultants to students when needed. This approach overcomes some of the potential problems of the formal approach, but it still demands a considerable amount of preparation and communication among all teachers. First, each should know the others' areas of academic expertise and personal interest. For example, the mathematics teacher may have a strong interest in anthropology as well as mathematics. This interest could be of great value to a group writing a report comparing contemporary and primitive attitudes toward the role of women in society. Second, the teacher should also know the others' attitudes about acting as consultant. If a teacher does not wish to participate, someone else should be contacted. Third, time should be made available during the school day when "consultants" can meet with students. This may necessitate rearrangement of schedules or sharing of classes. Finally, all should have the opportunity to share ideas about projects and potential ramifications. The science teacher, for example, may be able to foresee potential involvement or problems with a technical report on an environmental issue that the social studies teacher might have overlooked. These insights provide valuable extensions of projects and promote greater interaction among teachers in all the disciplines.

In addition to the various content areas, teachers might also search for ways to promote active participation from the "specialty" teachers, such as art, shop, and music. Often these teachers are able to help students with supporting materials for reports and presentations which other teachers might not

anticipate, such as graphics, models, and background music. The more legitimate contribution a teacher can bring to bear on a particular project, the greater the potential of that learning experience, especially if the involvement is coordinated and natural.

Have students create a gadget and market it. Begin this extensive activity by discussing various needs around the home and school (e.g., What kind of tool or machine might make your life easier at home or in school?). List students' comments on the board.

Select a few of the more interesting gadgets and discuss some of their attributes, such as appearance, mechanics, etc. List on the board.

Have students work in small groups. Each group should select one gadget and explore its possibilities and attributes in detail. As a full class each group shares its gadget description. Members of the class should ask questions and add to descriptions of the gadgets. After this discussion each small group should reconvene to discuss the various steps necessary to "develop" and "market" its gadget. Have each group design a flow chart for its plan.

Unless students are particularly able and the school has appropriate facilities, the gadget will have to be "developed" on paper only. However, students should still design a scientific procedure for this process. For this purpose they may have to meet with the science teacher. During this stage the group should carefully describe the development of the gadget and submit a scientific report about the gadget at the end of the stage.

Once developed, students are ready to analyze a market for the gadget. Although there are texts on market analysis, it might be more interesting and productive to invite a local advertiser in to discuss the process. Students should be prepared to use the information in their own procedure for analyzing the market for their particular gadget.

As part of the market analysis have students design a survey or public opinion questionnaire for the gadget. In this survey they should consider various demographic data such as geographic distribution, age, sex, etc., as well as cost and applicability of the gadget. The social studies teacher should be able to help with this aspect. If possible, have the groups actually conduct small surveys of specific populations to discover the feasibility of their gadget. After they have conducted the survey, they should analyze the results. They may need

help from the math teacher for this analysis. A report describing the procedure, findings, and recommendations should be submitted at the end of this stage.

Next, have the groups market the gadgets. This phase includes sending various business letters to prospective distributors, creating brochures and advertising campaigns, writing job descriptions for sales representatives, conducting demonstrations of the gadget to various groups, etc. Depending upon the involvement, you might actually give students a budget within which they have to work for advertising. They then must decide among various media and times, using advertising costs available from local TV and radio stations, newspaper and magazine offices, etc. After they have the background information for the advertising campaign, they could design the campaign, including art work, commercials, jingles, etc.

Finally, each group should write an inclusive report of its activities, including involvement of consultants, hypothetical cost, problems, and recommendations for work with the gadget.

This activity has the potential for involving many teachers and several members of the community. Although teachers may see the value of the activity as a learning experience, they should still list the various skills within each discipline that are actually covered through the project.

English

- Writing of reports, business letters, job descriptions, technical descriptions
- Careful selection of visual and verbal symbols to manipulate an audience (an approach to critical reading and viewing)
- Development of group discussion skills

Mathematics

- Knowledge of mathematical terms used in analysis of data (mean, mode, average, etc.)
- Reporting mathematical analysis in terminology favorable to a specific purpose
- Selection and application of appropriate statistical tests for analysis of questionnaires
- Application of mathematical skills involved in establishing and maintaining a budget

- Creation of appropriate visual media to convey mathematical concepts (e.g., graphs, charts, etc.)
- Use of probability and other inferential concepts in projecting hypothesis (e.g., profits, costs, etc.)

Social Studies

- Application of interviewing techniques
- Designing and interpreting graphs and charts
- Knowledge and application of propaganda techniques
- Knowledge and application of skills involved in polling (e.g., sampling techniques, design of questionnaires, etc.)
- Application of map skills involved in demographic analysis of population interviewed
- Knowledge of environmental issues as examined through analysis of environmental impact of gadget (e.g., energy use, permanent or disposable item, etc.)
- Knowledge of current social trends as reflected in contemporary advertising techniques

Science

- Designing and applying an operational definition
- Application of appropriate measurement skills
- Writing a scientific report
- Designing a scientific method to develop and market gadget (problem solving, writing a hypothesis, observation, analysis, inference, identity variable, etc.)

Art

- Knowledge and application of design skills for advertising layout
- Knowledge and application of color, balance, etc., involved in visual displays

Music

- Appropriate application of musical skills in advertising campaign

NOTES

1. Bellanca, James A. *Grading.* Washington, D.C.: National Education Association, 1977.
2. Blake, Robert W. "How to Talk to a Writer." *English Journal,* November 1976.
3. _____ and Tuttle, Frederick B., Jr. *The Albion Project.* Albion, N.Y.: Albion Central School, 1977. ED 146 590.
4. _____ and _____. *Composing as the Curriculum: A Guide for Instruction in Written Composition, Grade K–12.* Albion, N.Y.: Albion Central School, 1978.
5. Cooper, Charles. "Measuring Growth in Writing." *English Journal,* March 1975.
6. Cunningham, Donald and Estrin, Herman A., eds. *The Teaching of Technical Writing.* Urbana Ill.: National Council of Teachers of English, 1975.
7. Dumas, Terry. "Using the Composing Process with Seventh Graders." Master's thesis, State University of New York, College at Brockport, 1978.
8. Estrin, Herman. "Engineering Students Write Science Books for Children." *The Technical Writing Teacher* 1 (Winter 1974): 1–5.
9. Gilman, William. *The Language of Science.* New York: Harcourt, Brace and World, 1961.
10. Marshall, Jon Clark. "The Effect of Selected Composition Errors on Grades Assigned to an Essay Examination by High School Teachers." Dissertation, University of Kansas, 1966.
11. Murray, Donald M. "Internal Revision: A Process of Discovery." Paper for the Buffalo Conference on Research in Composing, State University of New York at Buffalo, 1975.
12. National Education Association. *Evaluation and Reporting of Student Achievement.* Washington, D.C.: National Education Association, 1974.
13. _____. *Standardized Testing Issues: Teachers' Perspectives.* Washington, D.C.: National Education Association, 1977.
14. Slaate, Howard A. *Modern Science and the Human Condition.* Santa Barbara: Visual Education, 1974.
15. Tuttle, Frederick B., Jr. *Composition: A Media Approach.* Washington, D.C.: National Education Association, 1975.
16. _____. "Irondequoit Composition Study: A Follow-Up." Report. Irondequoit, N.Y.: Irondequoit High School, 1978.
17. _____. *Gifted and Talented Students.* Washington, D.C.: National Education Association, 1978.
18. _____. "Written Composition: Integrated Approach Following the Composing Process." Report. Irondequoit, N.Y., 1977. ED 146 587.
19. Weisman, Herman M. *Basic Technical Writing.* 2nd ed. Columbus, Ohio: Charles E. Merrill Publishing Co., 1968.

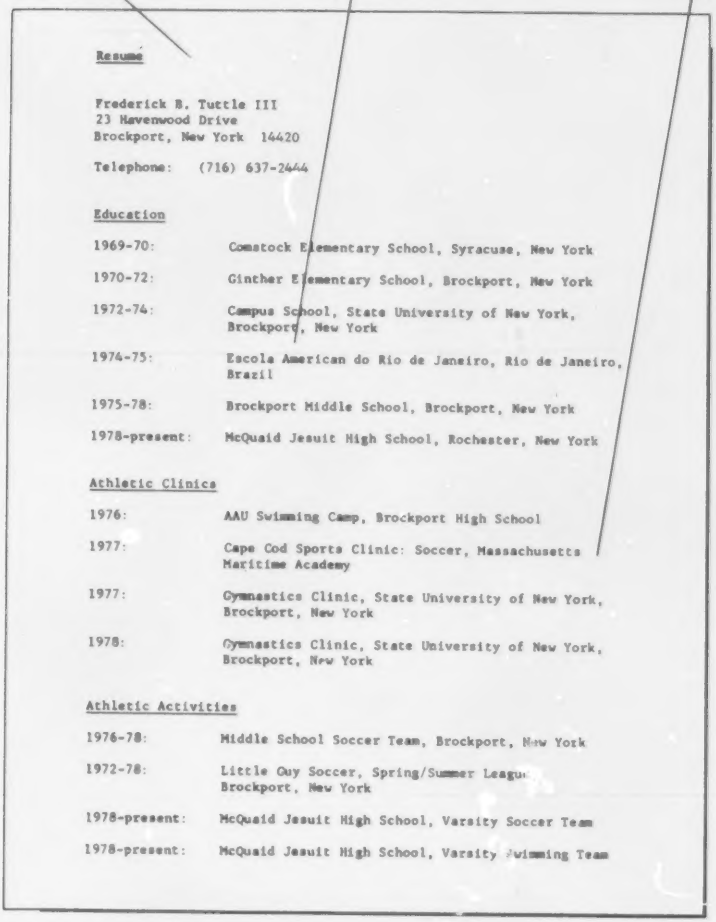
APPENDIX 1
BUSINESS WRITING

Resumé

This sample resumé was prepared in application for a summer recreation position.

Since he wants to list Brazil, he has to include locations of all schools separately.

Since the resumé is for a recreation position, he highlights activities pertaining to recreation.



Resumé

Frederick B. Tuttle III
23 Havenwood Drive
Brockport, New York 14420

Telephone: (716) 637-2444

Education

1969-70: Comstock Elementary School, Syracuse, New York

1970-72: Ginther Elementary School, Brockport, New York

1972-74: Campus School, State University of New York, Brockport, New York

1974-75: Escola American do Rio de Janeiro, Rio de Janeiro, Brazil

1975-78: Brockport Middle School, Brockport, New York

1978-present: McQuaid Jesuit High School, Rochester, New York

Athletic Clinics

1976: AAU Swimming Camp, Brockport High School

1977: Cape Cod Sports Clinic: Soccer, Massachusetts Maritime Academy

1977: Gymnastics Clinic, State University of New York, Brockport, New York

1978: Gymnastics Clinic, State University of New York, Brockport, New York

Athletic Activities

1976-78: Middle School Soccer Team, Brockport, New York

1972-78: Little Guy Soccer, Spring/Summer League, Brockport, New York

1978-present: McQuaid Jesuit High School, Varsity Soccer Team

1978-present: McQuaid Jesuit High School, Varsity Swimming Team

He stresses recreational aspect of travels. Had the position been more academic, he might have listed these as "Extensive travel through major European cities and countries" and cited more cities such as Paris, Barcelona, Rome, etc.

Although some of these experiences may seem minor, they demonstrate dependability, reliability, and some athletic ability.

Related Work Experiences

1970-78: Babysitter

1976: Substitute Soccer Coach

1977: Newspaper Carrier

1977-78: Construction Assistant

Travel Experiences

Camping vacation in Europe (countries: Germany, Italy, Spain, Austria, France, Luxembourg, Andorra)

Camping vacation in United States (from Maine to California)

One year in Rio de Janeiro, Brazil

Languages

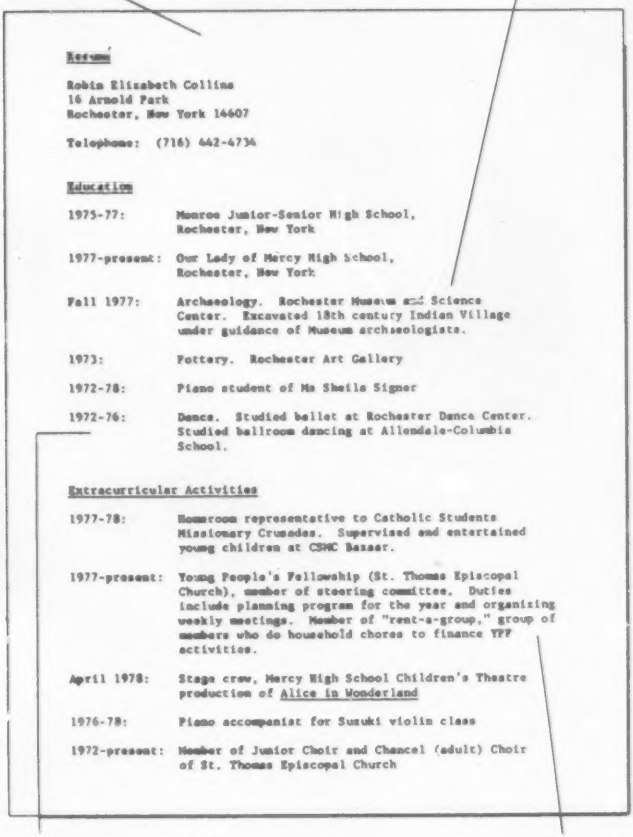
Portugese: Speaking and reading

Spanish: Reading

Resumé

This sample resumé was prepared in application for a position to work with preschool children as aide in a day-care center or recreational program.

She includes special courses and programs relevant to activities that might be part of the position.



Resumé

Robin Elizabeth Collins
16 Arnold Park
Rochester, New York 14607

Telephone: (716) 442-4734

Education

1975-77: Monroe Junior-Senior High School, Rochester, New York

1977-present: Our Lady of Mercy High School, Rochester, New York

Fall 1977: Archaeology. Rochester Museum and Science Center. Excavated 18th century Indian Village under guidance of Museum archaeologists.

1973: Pottery. Rochester Art Gallery

1972-78: Piano student of Ms Sheila Signer

1972-76: Dance. Studied ballet at Rochester Dance Center. Studied ballroom dancing at Allendale-Columbia School.

Extracurricular Activities

1977-78: Homeroom representative to Catholic Students Missionary Crusades. Supervised and entertained young children at CSMC Bazaar.

1977-present: Young People's Fellowship (St. Thomas Episcopal Church), member of steering committee. Duties include planning program for the year and organizing weekly meetings. Member of "rent-a-group," group of members who do household chores to finance YPF activities.

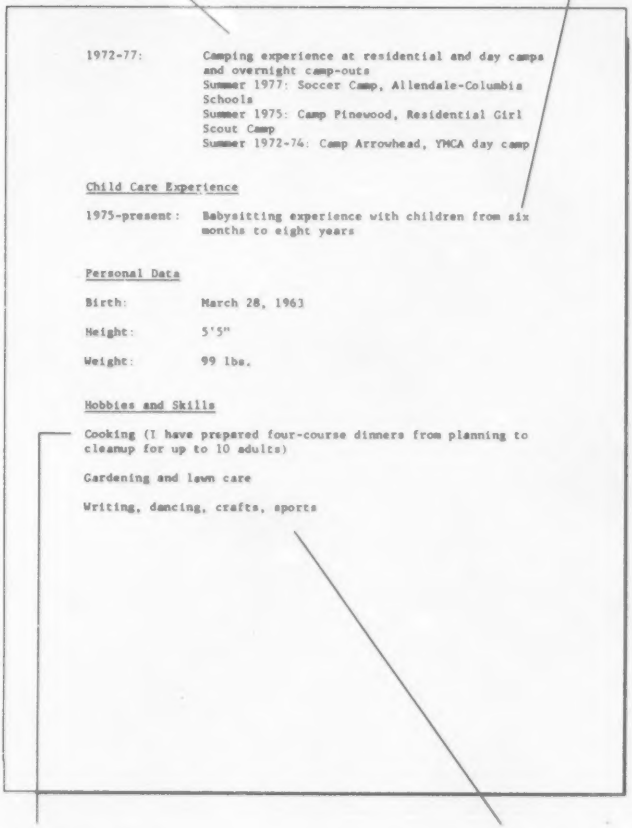
April 1978: Stage crew, Mercy High School Children's Theatre production of Alice in Wonderland

1976-78: Piano accompanist for Suzuki violin class

1972-present: Member of Junior Choir and Chancel (adult) Choir of St. Thomas Episcopal Church

She shows the variety of experiences and abilities she can bring to the position.

She emphasizes activities which highlight supervisory responsibility and organizational ability.


These experiences are important to mention because of recreational possibilities.
By listing "babysitting" under "child care," she emphasizes her ability to work with young children.
1972-77: Camping experience at residential and day camps and overnight camp-outs
Summer 1977: Soccer Camp, Allendale-Columbia Schools
Summer 1975: Camp Pinewood, Residential Girl Scout Camp
Summer 1972-74: Camp Arrowhead, YMCA day camp
Child Care Experience
1975-present: Babysitting experience with children from six months to eight years
Personal Data
Birth: March 28, 1963
Height: 5'5"
Weight: 99 lbs.
Hobbies and Skills
Cooking (I have prepared four-course dinners from planning to cleanup for up to 10 adults)
Gardening and lawn care
Writing, dancing, crafts, sports
This activity shows responsibility.
The hobbies and skills stress variety of interests.

Job Description

The following is a job description for workers in the field of animal care. We compiled this description from information* in a high school guidance office. Teachers may compile their own job descriptions of positions of particular interest to their students from resources in their own guidance and counseling offices.

Animal care means providing services related to the health and well-being of animals. Examples of workers in this group include Horse Exerciser, Dog Groomer, Veterinary-Hospital Attendant, Stable Attendant, and Animal Caretaker.

Work Performed.

What are the tasks usually performed by workers in this field? Workers in this field take care of animals by performing such tasks as providing feed and water, including any required special diet; providing and taking care of shelter, such as stables or kennels; training and exercising them; grooming them, including shampooing, brushing, and clipping; and treating minor illnesses or injuries. Some workers in this group specialize in the care of a particular kind of animal such as horses or dogs. Others may work at zoos, pet shops, laboratories, or for veterinarians.

Worker Requirements.

What qualifications are needed? Workers in this field must (1) like animals and be concerned with their well-being; (2) be able to use hands and fingers rapidly and accurately; (3) be able to move rapidly and to coordinate the movement of their eyes, hands, and feet; (4) be able to adjust to the routine of unchanging tasks; and (5) maintain the physical strength required for work tasks.

* Specific information taken from *The U.S. Army Career and Education Guide, Student Edition*, pp. 3–193, 3–194.

Clues for Relating Applicants and Requirements.

What personal characteristics and experiences suggest further exploration in this field?

1. Owning and caring for pets or work animals.
2. Part-time work experience in a kennel or stable.
3. Interest in the welfare of animals.
4. Good physical condition.
5. 4-H, scout or school science projects involving the care of animals.

Training and Methods of Entry.

What preparation is needed and how is employment obtained? Workers in this group find opportunities for employment in large cities where there are many pets and services for their care, and in rural areas where breeding, raising, and caring for animals is an important source of income. Beginning workers are usually assigned simple tasks and advance to more difficult tasks through on-the-job experience. The U.S. Army offers one training program for army occupations which fall in this group. It is open to new enlistees.

Qualifications Profile.
General Educational Development (GED).

Most jobs in this group require the following level of educational development: the ability to apply common sense understanding in carrying out detailed but routine written or spoken instructions and to make occasional decisions involving changes from established procedures; the ability to apply mathematics and language skills usually acquired by the end of sixth grade.

Interests.

Workers in this group usually prefer:

1. Activities of a routine, definite, organized nature—rather than—activities of an unusual, indefinite nature which require creative imagination.

2. Activities which involve direct personal contact, to help people or deal with them for other purposes—rather than—activities which are nonsocial and involve the use of machines, processes, or methods.
3. Activities concerned with people and the communication of ideas—rather than—activities dealing with things and objects.

Temperaments.

Workers in this group must usually adjust to the following kinds of working conditions or situations:

1. Performing a variety of duties which may often change.
2. Doing things only under specific instructions, allowing little or no room for independent action or judgment in working out job problems.
3. Rating information using standards that can be measured or checked.

Physical Demands.

The following physical activities may be required of workers in this group:

1. Heavy lifting and carrying (no more than 100 pounds).
2. Stooping, kneeling, crouching, and/or crawling.
3. Reaching, handling, fingering, and/or feeling.
4. Seeing—to determine size, shape, distance, motion, or color.

Letter of Inquiry

416 Pleasant Street
Happytown, New York 14706
September 19, 1978

Dr. Eleanor O'Brien, Principal
Jamesville High School
Jamesville, Oklahoma

Dear Dr. O'Brien:

My family will move to Jamesville in December when I will enroll as a senior in high school. I want to make sure that I can transfer credit for the courses I am currently enrolled in and that the academic requirements of the courses I am taking are similar to those at Jamesville High School.

1. I am taking Advanced Placement English and plan to take the examination in May 1979. Do you offer a similar course, or can I arrange for special tutoring to be prepared for the AP exam?

2. I am taking Typing I. My teacher expects that students have achieved 30 wpm with three errors on a timed 1st-minute writing by the end of November. Will this standard qualify me to enter your Typing I class in December?

3. I have played Varsity Lacrosse for three years. Will I be eligible to compete on the Jamesville High School team?

Knowing more about the high school program will help me plan for a smooth transition. I look forward to meeting you in December.

Sincerely,

James Fulbright

The *simplified block style* minimizes spacing problems since all parts of the letter are flush with the left margin.

Double space between sections of the letter *except* for space between return address and inside address, which may range from ten to three spaces depending on the length of the body.

In this brief introduction he provides pertinent background for the inquiry.

Triple space between paragraphs when paragraphs are not indented.

He separates the questions into numbered items for ease of reading and responding, arranging them from most to least important.

He presents himself as an efficient, polite, interested individual.

Letter of Application

The block style is used as often as the modified block. Letter is single spaced.

No more than ten spaces between return address and inside address.

If possible, find out the person to whom you should write.

208 Spring Street
Hardwick, Vermont 24803
May 12, 1978

Mr. Dino Lipari
Personnel Manager
Hardwick Paper Company
Hardwick, Vermont 24842

Dear Mr. Lipari:

My guidance counselor, Mr. Henry Gruen, gave me your brochure on your Summer Student Intern Program. I would like to apply for a position as Intern. I understand that I commit myself to work full-time in the program this summer and fifteen hours a week during the school term.

I have completed three years in the vocational/technical program at Watt High School with a B+ average. My major is mechanical technology. Last summer I worked as an apprentice mechanic for Best Construction Company where I had experience in repairing heavy equipment. I have worked part-time as assistant mechanic for Johnnie's Texaco Station since I was 13 years old. I am eager to learn more about the Hardwick plant. I believe I can make a contribution to your operation.

I am available for an interview anytime after school dismissal at 3:05 P.M. You can reach me at home after 3:30 P.M. or leave a message anytime. My telephone number is 472-2998.

Yours truly,

James White

He states specific reason for application and understanding of position.

Letter is double spaced between sections.

He gives some indication of qualifications for this position.

He provides information so prospective employer can contact him easily.

Letter of Complaint

The modified block style is one of the most common arrangements. It differs from block style only in indented paragraphs.

The writer explains why this complaint has not been settled at a lower level.

He explains complicated circumstances as fully as possible in a logical or chronological sequence.

He is explicit about the remedy expected.

1946 Bybee Street
Columbus, Ohio 43216
January 3, 1979

Mr. Carlos Escholtz, President
Sav-U Discount Store
14 State Street
Chicago, Illinois 60610

Dear Mr. Escholtz:

My Business Law teacher has advised me to write directly to you about a problem I have been unable to resolve satisfactorily with Mr. Jamison Andrews, the manager of the Columbus Sav-U branch.

In October I ordered six copies of the Group's new version of "All of You" on the Quickie label from Sav-U's record department. When the order arrived, I stored the package in a cool room in an upright position. I did not open it until Christmas Eve when I was prepared to wrap the records. At that time I discovered that two of the records were badly warped and one lacked a perforation for the spindle. I had to go out of town with my family until New Year's Day. When I returned the three defective records on 2 January, the manager of the record department informed me that no refunds are made for merchandise purchased more than 30 days earlier. He also said that they had discontinued the Quickie label and couldn't refund my money even if I met the 30-day requirement. When I spoke with Mr. Andrews, he repeated the record manager's explanation and told me to leave the store and not return until I had a haircut and was properly dressed (I was wearing a personalized T-shirt and overalls).

Mr. Escholtz, I am out $4.00 for the three records through no fault of my own. I believe Sav-U owes me a refund and an apology. Most of the record department's customers are teenagers whose appearance may not suit Mr. Andrews, but we do spend our money at Sav-U. I hope you can restore my faith in the Columbus Sav-U.

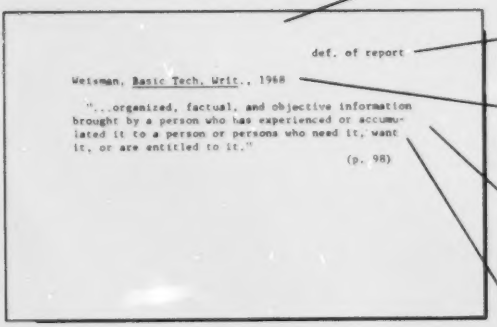
Sincerely,

Benjamin Stein

APPENDIX 2
REPORT WRITING

Note Cards

(4 x 6 or 5 x 8)


def. of report
Weisman, Basic Tech. Writ., 1968
"...organized, factual, and objective information brought by a person who has experienced or accumulated it to a person or persons who need it, want it, or are entitled to it."
(p. 98)

Each card contains one idea so that it can be arranged and rearranged easily—very important but sometimes forgotten in writer's haste.

Topic helps indicate potential use in final report.

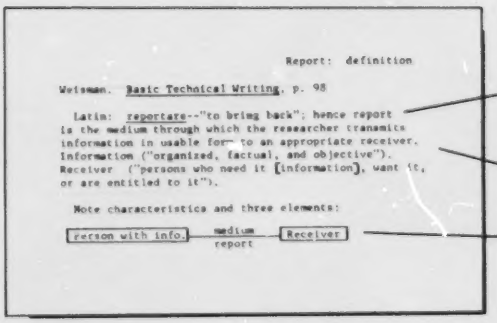
Give enough information to match with bibliographical card.

Direct quotation is given so that writer will know exactly what was said—can change in final report, if necessary, or use as a quotation.

Direct quotation as noted keeps writer from unconsciously rewriting a summary note too close to the original wording of the source.

Note Card No. 1

Paraphrasing of the section from which the quotation on Note Card No. 1 came:


Report: definition
Weisman. Basic Technical Writing, p. 98
Latin: reportare--"to bring back"; hence report is the medium through which the researcher transmits information in usable form to an appropriate receiver. Information ("organized, factual, and objective"). Receiver ("persons who need it [information], want it, or are entitled to it").
Note characteristics and three elements:
Person with info. — medium report — Receiver

"Common knowledge" such as can be found in dictionary, etc., does not have to be footnoted.

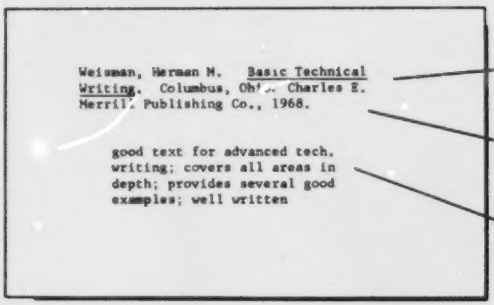
Writer may want to use these exact phrases.

Writer records idea for using the definition in structuring the paper.

No. 2 Paraphrased Note Card

Bibliographical Card

(3 x 5)


Weisman, Herman M. Basic Technical Writing. Columbus, Ohio: Charles E. Merrill Publishing Co., 1968.
good text for advanced tech. writing; covers all areas in depth; provides several good examples; well written
This card makes it easier to put sources in alphabetical order in bibliography.
Card is written as it would be in bibliography.
General comment gives impression of book (optional but practical for future reference).

Memo

Note that sender, receiver, subject, and date are usually printed in memo form. In any case, this information should appear at the top.

Some background is provided but not overly detailed

Specific directions are set off from text and numbered.

JAK-O-TRADES SERVICES

TO: Jason Everts

FROM: Evelyn Hickes

SUBJECT: Completion of cost estimates for Mr. Carlos Lopez

DATE: April 15, 1977

This morning I received your report on costs of electrical equipment and labor to install our alarm system, but it does not include the cost of override switches called for in the Lopez specifications.

1. If the override function is included in system model A-165, send me a copy of A-165 specifications and wiring diagram.

2. If the override function is not included in system model A-165, send me a revised estimate including cost of switches and cost of labor to modify our system and install the switches at the locations specified.

I must have the estimates by 5 P.M. Friday, April 22, because I am meeting with Mr. Lopez to go over our estimates early Monday morning.

Police Report

Note the memo format: from one member of an organization to another, brief and directive, numbered items.

MAJOR CITY POLICE DEPARTMENT

June 30, 1978

TO: Lt. B. C. Rogers, Tactical Planning

FROM: Chief R. G. Bills

SUBJECT: Planned Citizens' Rally, July 28, 1978

1. Request received and approved from Mr. R. G. Powers, coordinator for "Citizens' Rally for Better Housing," on July 28, 1978, 10:00 A.M.-12 noon.

2. Initial intelligence reports indicate the rally may have political as well as economic complexion.

3. Arrange for personal as well as public security. Historically, this group has been conservative in nature; however, if intelligence reports indicate outside influence, take appropriate action.

The items are numbered and separated for clarity and ease of writing and reading.

The writer is more concerned with clarity than with style. Accuracy and understanding are essential.

MAJOR CITY POLICE DEPARTMENT

July 15, 1978

TO: Chief R. G. Bills

FROM: Lt. B. C. Rogers, Tactical Planning

SUBJECT: Citizens' Rally, July 28, 1978 - Intelligence Summary

1. Time, Location, and Schedule: The rally is scheduled to begin at 10:00 A.M. and will be held at a vacant lot at Bird and Silver Street. The area is currently under the jurisdiction of the Urban Renewal Agency. They have no objections to the event. The rally group has filed an insurance coverage form with the City Corporation Counsel. The area to be utilized is a square city block approximately 1120 feet long and 960 feet wide. Bordering streets are Bird Avenue on north, Silver Street on south, Casey Street on east, and Thomas Street on west.

2. The event is to draw attention and support for a proposed low-income housing development at the rally location.

3. There are three leaders of the rally. Robert G. Powers, a male, 45 years old (DOB 3-11-33), is employed by G & G Metal Fabricating, 113 Jones Street. No prior criminal record, very active in community affairs. He has full community support and is well respected by both low-income and affluent members of our community. He is assisted by George F. Cartier, a male, 38 years old (DOB 5-28-40), 22½ Goff Street, employed by Action for an Active Community, a local organization, publicly funded. He has a prior juvenile record (car theft) and is currently under investigation for a state position in public housing. All inquiries and investigations are favorable. The third member of the organizing committee is Arthur A. Stock, a male, 59 years old (DOB 11-30-18). He resides at 127 South Prince Street, St. Louis, Mo. He is a semi-retired attorney who specializes in community organization. Captain R. O. Case, St. Louis P.D., reports Stock is well respected, a loyal citizen. He enjoys excellent reputation and has a large law practice managed by his son. Rallies in other areas coordinated by Mr. Stock have been successful, peaceful, and well structured. Other volunteers for the day have been checked, and no serious problems are anticipated. They will be identified by blue arm bands. A list will be furnished to Capt. G. A. Carr, 7th District Commander, who will supervise detail at event.

4. It is estimated that a crowd of 850-950 persons will be present. The area can comfortably accommodate 1200-1300 persons, as per Battalion Chief P. M. O'Reilly, Major City Fire Department.

5. The weather bureau at the Major City Airport states the weather on July 28 will be moderate, a frontal system is forming but may not affect the 28th. Constant updates will be provided.

6. The community is supportive of this event, and no problems are anticipated from outside groups.

7. Intelligence Team 4 reports several known burglars are planning several daytime jobs at houses of those in attendance. Photos and plate numbers are provided to district cars. A stakeout is planned. This is seven blocks from rally; no conflict is anticipated.

8. There are seven taverns in the general vicinity of the rally. The owners have been contacted and will not open until one hour after rally is concluded. They were all very cooperative in this matter.

9. The rally area will be cordoned off two blocks away for pedestrian traffic only. An emergency and dignitary car route has been established from First to Bird Street. The emergency entrance to hospital is on First Street, and the main line expressway entrance is also on First Street.

10. Congressional candidate B. L. Ralph, state senatorial candidate C. B. Clarke, and Vice-Mayor R. T. Stovie have indicated they will speak. Agent I. L. Case, Secret Service; Captain K. C. Crull, State Police; and Inspector P. S. Dell, Major City P.D., have been coordinating VIP security.

11. A command post has been established for the event in the third floor office of R. V. Stone & Sons Moving & Storage Company, 136 Cesey Street. A full, unobstructed view of the event is available from that location. Mr. Stone states no charges will be incurred by the city. T/Sgt. K. C. Sparks will install portable radio equipment 7/27/78 at the command post.

12. A 50-member emergency response team will be stationed at the city D.P.W. garage at Root and Thomas Street with full ordinance. They will be in place at 8:30 A.M. One hundred fifty additional E.R.T. members will be on pager call. It has been determined that a low police profile will be maintained, with two officers at each barricade, one two-man car at each corner post. Seven undercover officers will mingle with crowd and report any problems. Radio frequency TAC "7" will be used by detail.

13. A first aid van will be parked at the northeast corner of the area. It will be staffed by volunteer personnel from Major City Hospital.

14. Parking will be at a lot located at May and Paul Street at no charge. Buses will be directed to park at the rear of B & B Trucking, 1051 Tacoma Avenue.

15. A debriefing will be held at Room 465, Major City Public Safety Building at 4:00 P.M. 7/28/78. This will be attended by all unit command officers and tactical coordinators, Units 2, 3, and 6.

MAJOR CITY POLICE DEPARTMENT

July 30, 1978

TO: Chief R. G. Bills

FROM: Lt. B. C. Rogers, Tactical Planning

SUBJECT: Citizens' Rally, July 28, 1978

1. The rally commenced as scheduled at 10:00 A.M. It concluded peaceably at 12:35 P.M. There were no unexpected problems. Nine arrests were effected on the premises without any incidents.

2. The flow of traffic was obstructed by an unexpected break in the water main at the 500 block of Queen Avenue; however, this was compensated for by Capt. G. C. Paul, Traffic Division.

3. The crowd estimate was set at 975. The persons arrested were as follows:

3	Disorderly Conduct
	--1 intox.
	--1 male masquerading as woman
	--1 male subject using female restrooms
2	Dangerous Drug Possession
4	Grand Larceny (pickpockets)
9	

Also, the tactical stakeout team apprehended two subjects committing house burglary 1127 Stone Avenue. See attached T.S.O.T. report.

4. Respectfully request letters of appreciation be sent to the following:

R. V. Stone & Sons Moving and Storage Company
B & B Trucking
T. C. Skein, Major City D.P.W. Supervisor

Members of the same organization would understand abbreviations while people outside might not.

Abstract

This report investigates the need for a crossing guard at the corner of Benham Street and Creek Avenue. The first part of the report surveys the number of children between the ages of 5 and 12 who cross this intersection on their way to and from School 14. Between 75 and 138 children cross the intersection between 8:05 A.M. and 8:15 P.M. and between 2:35 P.M. and 2:45 P.M. on school days. The second section of the report analyzes traffic flow in the intersection between 7:45 A.M. and 8:30 A.M. and between 2:25 P.M. and 3:00 P.M. The traffic flow east into the intersection on Benham Street is heavy in the morning period, moderate in the afternoon period. The traffic flow west into the intersection is moderate morning and afternoon. The traffic flow south into the intersection from Creek Avenue is light in the morning period and heavy in the afternoon period. Traffic flow north from Creek Avenue is light morning and afternoon. The data strongly suggests that a crossing guard is needed at this intersection from 8:00 A.M. to 8:20 A.M. and from 2:20 P.M. to 2:50 P.M. The report further concludes that a traffic light may be necessary to control traffic at this intersection in the near future.

The abstract is a summary of the important information contained in the report and follows the title page of the report. Abstract helps reader find the section the reader wants to study further.

The abstract does not include all data, only the most pertinent.

Conclusions need to be specific.

Letter of Transmittal

The letter of transmittal is an official record that a requested report has been submitted. It is not necessary in informal reports. It is the first item in a formal report.

He provides some indication of report but states it very briefly.

He concludes with a statement of what is included in the report.

14 Harris Street
Oak Groves, Illinois 08042
March 28, 1978

Ms. Carma Fauld
English Department
Township High School
Oak Groves, Illinois 08042

Dear Ms. Fauld:

This report on student preferences about vegetables served in the THS cafeteria is hereby submitted in duplicate as you requested, one copy for you and one for Mr. George Cook, Director of THS Food Services.

The report includes a survey of vegetables served in THS cafeteria during the school year 1976-77, results of a survey of student preferences, and my recommendations.

Sincerely,

Harold Evers

Sample Report Format

1. Title page

2. Abstract (approximately 250 words)

3. Table of contents

4. Introduction
   - 4.1 Purpose, subject, problem
   - 4.2 Background (when necessary)

   Tell reader what you are going to talk about: who, what, when, where, why.

5. Procedure (how)
   - 5.1 How gathered, sources, tests, techniques used
   - 5.2 Number of samples, number of participants, requirements
   - 5.3 How information or samples analyzed, statistics computed, comparisons made

   Give steps taken to acquire data for analysis and how it will be analyzed.

6. Results (report of findings during the procedure)

   Provide factual account of what happened.

7. Discussion of results, implications, and recommendations

   Here you can cite more research and refer to introduction.

8. Appendix

9. Bibliography (references used in report)

APPENDIX 3
SCIENTIFIC WRITING

Sample Laboratory Report Form

Object or Purpose

Explanation of the theory underlying the experiment and its relationship to the object of the experiment; the final question or hypothesis.

Procedure

Explanation of the steps needed to implement the experiment; list of apparatus and materials to be used; formulae or equations which will be used to perform the calculations.

Data

Tabulation of the results of the measurements described under procedure.

Calculations

Includes sample calculations as well as calculated results presented in tabular form.

Error Analysis

Explanation of why the writer's experimental results and predicted results do not agree.

Conclusions

Answers the question asked or implied in the object and any other conclusions based on the data, calculations, and analysis of error.

NOTE: *This format is based on forms for laboratory reports in several science areas. It may be adapted as the teacher wishes to fit various kinds of experiments and particular classes.*

APPENDIX 4
IMPLEMENTATION

Selected Resources

1. *REGULAR SOURCES FOR THE TECHNICAL WRITING TEACHER*

Journals

Journal of Technical Writing and Communication, ed., Jay R. Gould. Published quarterly by Baywood Publishing Company, 43 Central Drive, Farmingdale, N.Y. 11435.

Technical Communication. Published quarterly by the Society for Technical Communication, 1010 Vermont Avenue, Washington, D.C. 20005.

The Technical Writing Teacher. Published three times a year by the Association of Teachers of Technical Writing, Morehead State University, Morehead, Ky. 40351.

Contains short articles about teaching technical writing that are of interest to teachers at all levels. Also reviews selected textbooks.

Books and Articles

Beakley, George C., Jr., and Autore, Donald D. *Graphics for Design and Visualization*. New York: Macmillan Co., 1973.

Cunningham, Donald and Estrin, Herman A. *The Teaching of Technical Writing*. Urbana, Ill.: National Council of Teachers of English, 1975.

A collection of articles about the purposes and strategies in teaching technical writing.

Dyers, Robert D. "The Relative Effectiveness of Proposal Approaches —An Experimental Study." *Technical Communication* 22 (First Quarter 1975): 9–11.

A study of the characteristics of an effective proposal by a consultant specializing in developing proposals submitted to the federal government.

Estrin, Herman. "Engineering Students Write Science Books for Children." *The Technical Writing Teacher* 1 (Winter 1974): 1–5.

Describes Professor Estrin's assignment to civil engineering students to teach adaptation of materials to audience.

Ewer, J. R. and Latorre, G. A. *A Course in Basic Scientific English*. New York: Longman, 1975.

Harris, John Sterling. "So You're Going to Teach Technical Writing: A Primer for Beginners." *The Technical Writing Teacher* 2 (Fall 1974): 1–6.

Discusses the nature of technical writing, who should teach it, how the teacher gets additional training.

Kamm, Isabelle M. "Technical Writing for Science Students." Wall, N.J.: Wall High School, 1977.

Mimeographed course descriptions for technical English.

———. "Syllabus—Technical English." Wall Township Public Schools, N.J.: Wall High School, 1976.

Includes list of units, objectives, and sample lesson plan.

Keatley, Lu. *Career and Personal Record Book.* Specialty Book (P.O. Box 1785, Ann Arbor, Michigan 48106).

A collection of samples of documents frequently used, from income tax forms to check stubs and credit card receipts.

Rainey, Bill G. "Proposal Writing—A Neglected Area of Instruction." *Journal of Business Communication* 12 (Summer 1974): 30–39.

Suggests that more proposal writing be taught, and describes objectives for a course or unit on proposal writing, as well as student activities.

Schindler, George E., Jr. "Why Engineers and Scientists Write as They Do—Twelve Characteristics of Their Prose." *IEEE Transactions on Professional Communication* 18 (March 1975): 5–10.

Contrasts technical with nontechnical prose to explain the differences. Gives illustrations of differences.

Sparrow, W. Keats and Cunningham, Donald H. *The Practical Craft: Readings for Business and Technical Writers.* Boston: Houghton Mifflin Co., 1978.

A collection of articles about business and technical writing designed for the student in a college technical writing course. For high school teachers, the collection provides an introduction to the purpose of technical writing and examples of the style and strategies of technical writing.

"Write a Better Instruction Manual." *Machine Design* 57 (January 23, 1975): 117.

Brief practical advice in writing effective instructions.

2. *STYLE MANUALS*

Almost every field has its own style manual, as do many large corporations. The teacher may want to collect some of these publications. Strunk and White is concerned with word choice, usage, and diction rather than footnote and bibliographical form. All three are standard works.

A Manual of Style. Rev. 12th ed. Chicago: University of Chicago Press, 1969.

Strunk, W., Jr., and White, E. B. *The Elements of Style.* 2nd ed. New York: Macmillan Co., 1972.

A classic reference tool for writers which provides specific suggestions to improve style, including sentence structure, word choice, and mechanics.

United States Government Printing Office. *Style Manual.* Rev. ed. Washington, D.C.: Government Printing Office, 1967.

3. *RESOURCES FOR IMPLEMENTING THE COMPOSING PROCESS*

Blake, Robert W. and Tuttle, Frederick B., Jr. *The Albion Project.* Albion, N.Y.: Albion Central School, 1977., ED 146 590.

This report describes the rationale and procedures used in establishing a composition-based curriculum, K–12, at Albion Central School, Albion, New York. An interim report containing suggestions for follow-up work.

_____ and _____. *Composing as the Curriculum: A Guide for Instruction in Written Composition, Grade K–12.* Albion, N.Y.: Albion Central School, 1978.

A complete report of the establishment of a composition-based English/language arts program, K–12. Included in the report are rationale, scope and sequence of activities, and sample lesson plans for each grade.

Dumas, Terry. 'Using the Composing Process with Seventh Graders." Master's thesis, State University of New York, College at Brockport, 1978.

A replication of an earlier study (Tuttle, 1977), this thesis supports the use of the composing process as an instructional procedure. The major results were that the experimental group improved significantly in quality, usage, and fluency and also showed superior gains over the control group in each of these areas.

Tuttle, Frederick B., Jr. *Composition: A Media Approach.* Washington, D.C.: National Education Association, 1978.

A practical approach to implementing the composing process in the classroom. Included in the text are many classroom activities illustrating how various media may be used to lead the student through the composing process in narration and exposition. Also included is a section on production of media in the classroom and grading.

_____. "Irondequoit Composition Study: A Follow-Up." Report. Irondequoit, N.Y.: Irondequoit High School, 1978.

To determine if the students in the experimental group from a previous study (Tuttle, 1977) continued their growth, a small sample was followed into tenth grade. The main finding was that their compositions continued to improve significantly in quality, usage, and fluency.

_____. *Gifted and Talented Students.* Washington, D.C.: National Education Association, 1978.

A review of current research in education of the gifted and talented in the United States. Included in the text are characteristics of the gifted and talented and problems in identifying them, as well as program development to meet their special needs. Also included is an examination of some special issues such as the disadvantaged gifted and the teacher of the gifted.

———. "Written Composition: Integrated Approach Following the Composing Process." Report. Irondequoit, N.Y., 1977. ED 146 587. An investigation of the effectiveness of using the composing process as an instructional procedure in ninth grade. This study demonstrated significant growth within the experimental group and significant gains of the experimental over the control group in quality, usage, and fluency. Included in this report are lessons used, evaluation instruments, and bibliography as well as the report of the investigation itself.

Real Audiences and Situations

Another Class

- Have the class compose on the board a letter of inquiry, memo, or set of directions which the other class will answer.
- Find writing jobs that people want done in the school (e.g., science teacher may need directions for using equipment, lower grade teacher may need directions for younger students).
- Establish a correspondence between two schools (e.g., requests for information, projects, etc.).

Other School Groups

- Could the PTA use a newsletter or help in producing an existing one? Students could produce one issue of the newsletter, from assignment of topics to distribution of final paper.
- Could the class or individual students provide the local newspaper with reports of academic programs in the school?
- Have the class or students make a relevant presentation to the PTA.
- Could the school guidance department use some profiles of recent alumni who have advice for students in the school?
- Would the English department like a booklet of writing tasks and letter formats?
- Would any department like information about the need for their courses after school? Students could write alumni for their ideas about the usefulness of studies in school.
- Prepare for the guidance department a brochure on summer and part-time jobs (potential employers, skills, hints, etc.).

Community Groups

- Students could perform a valuable service to groups who need information collected and organized. The information could be collected, summarized, and presented to a group as a report with recommendations.
- Students could help a citizens' group save a historical site by gathering history of the area and presenting a report.
- A parents' group may want to request a crossing guard and may need information about the intersection, number of children involved, and a proposal to the city.
- Community action or environmental groups may also provide projects involving research and recommendations.

Local Businesses

- Ask the proprietor of a nearby, popular fast-food store or local firm that hires alumni from the school to read and comment on resumés and letters of application.
- Ask local business people to come to the class to discuss the job market, interviewing, basis for hiring, etc.
- Ask the manager of a local store specializing in items for adolescents if s/he would like a survey of student attitudes. Students could design questionnaire, conduct survey, analyze results, write report, and make recommendations.

We did not intend to present an exhaustive list of potential audiences, just enough to indicate the breadth of possibilities. Indeed, the potential list is almost endless once the teacher decides that the class will seek out real audiences. The list and activities may become even more productive and meaningful if students are involved in the search for audiences.

Tips to Writers

Ways to Organize Paragraphs

- chronological
- spatial (by location, geography, etc.)
- functional
- order of importance
- elimination of possible solutions
- general to particular (deductive)
- particular to general (inductive)
- simple to complex
- pro and con
- cause and effect
- categorizing and listing

General Hints for Editing

Good editing consists of at least two steps:

A. An overall reading to check
   1. Is the purpose clear?
   2. Is the message complete and logical?
   3. Do paragraphs flow together smoothly?
   4. Are the style and tone appropriate?

B. Close reading to catch mistakes and improve clarity and economy
   1. Active voice for verbs?
   2. Modifiers in the right place?
   3. Natural, clear word choice?
   4. Punctuation?
   5. Pronoun references?
   6. Spelling?

Most people prefer to do their close editing paragraph-by-paragraph. Beginners, however, may find it easier to edit the whole paper for one thing at a time. Whichever approach you use, be sure to reread the entire text when you finish to make sure that particular revisions have not spoiled the overall flow.

Always look closely at the final typed copy *before* you send it out. Remember that sloppy typing reflects on the signer!